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AUTOMATED PAVEMENT MAINTENANCE AND REPAIR MANAGEMENT SYSTEM.(U)
JUN 77 M Y SHAHIN, F M ROZANSKI

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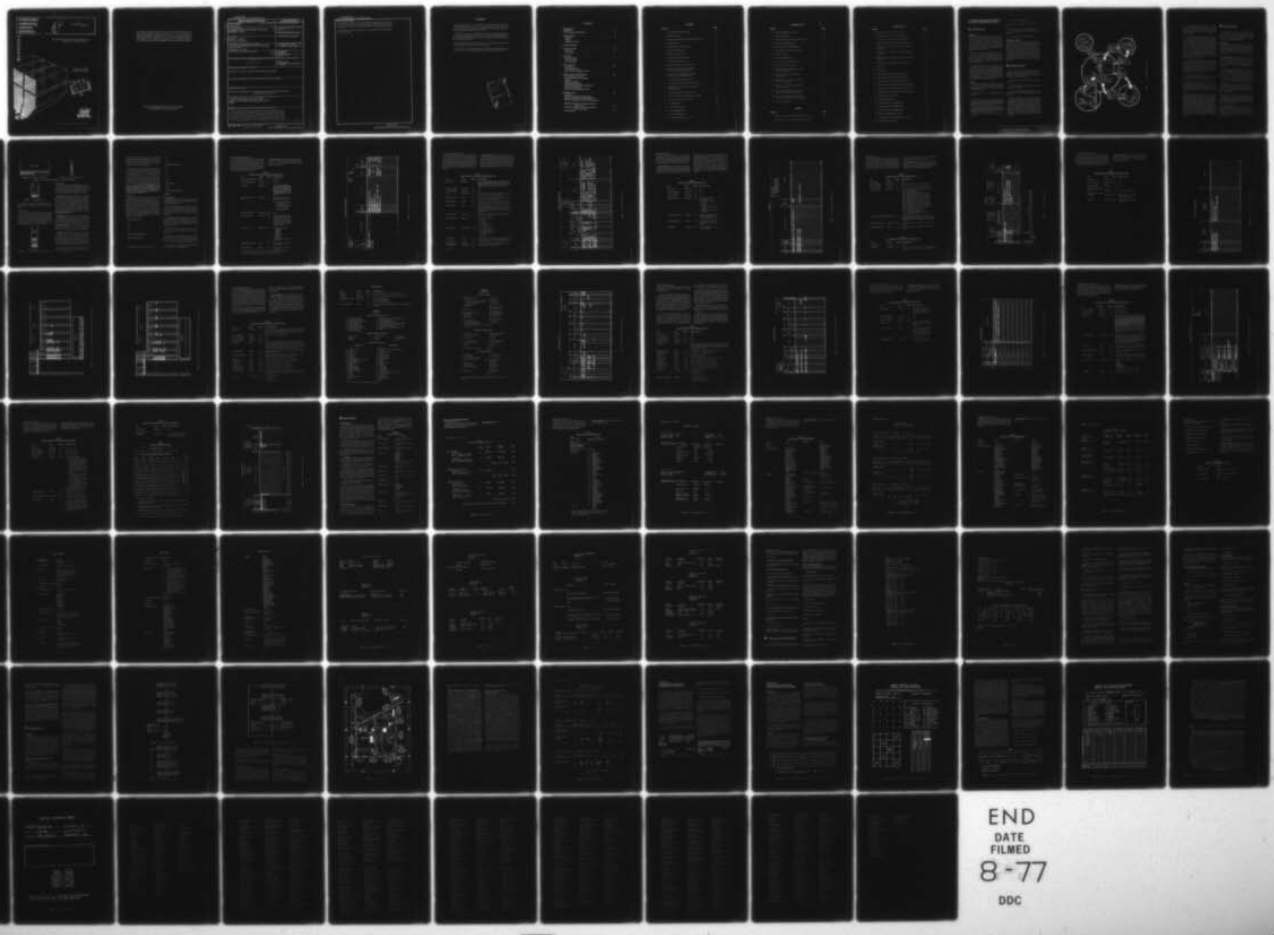

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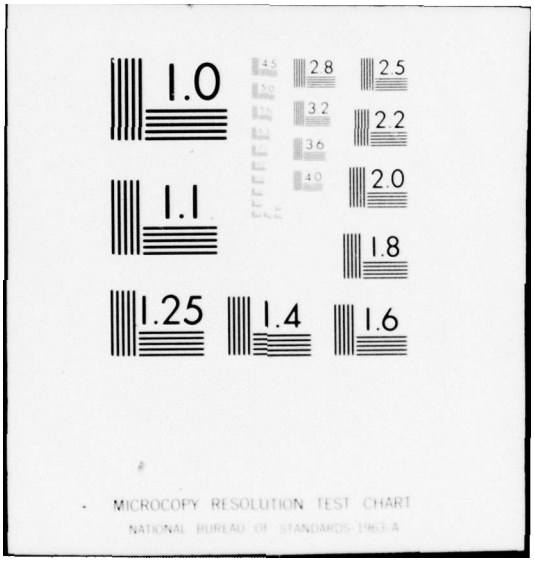
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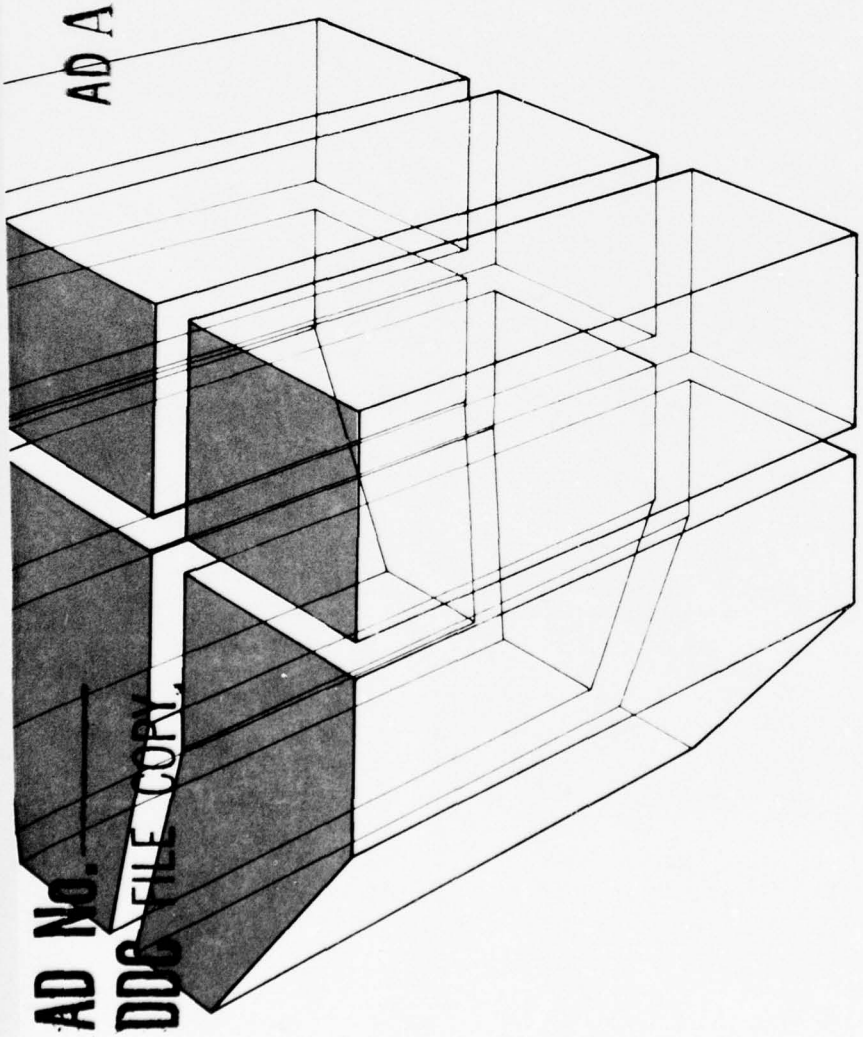
INTERIM REPORT C-79
June 1977

AUTOMATED PAVEMENT MAINTENANCE AND REPAIR MANAGEMENT SYSTEM



by
Mohamed Y. Shahin
Francine M. Rozanski

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20. ABSTRACT *(Continue on reverse side if necessary and identify by block number)*

This report describes the use of a computer system designed to aid the facilities engineer in managing pavement maintenance and repair. The system, called PAVER, consists of a computer data base for storage of relevant pavement information, forms for collecting data, and a set of report-generator programs to retrieve information from the data base in an organized format. Adoption of the system will help the facilities engineer achieve the following benefits: prevention of over- or undermaintenance of pavements, more effi-

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cient utilization of funds, more efficient scheduling of maintenance activities, rapid retrieval of pavement information (especially important in determining work requirements for submission to the shop or contractor), and documentation of pavement performance.

Procedures are presently being developed to interface PAVER with the Integrated Facilities System (IFS).

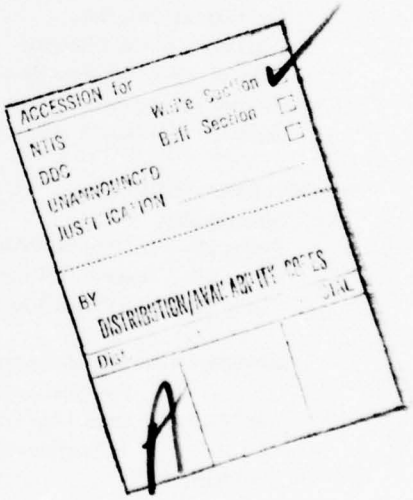
FOREWORD

This work was performed for the Directorate of Facilities Engineering, Office of the Chief of Engineers (OCE), as part of the FY7T OM&A Program 728012.14, Facilities Investigation Studies, "Automated Pavement Maintenance and Repair Management System." The OCE Technical Monitor is Mr. L. H. Price.

The work was conducted by the Military and Base Engineering Branch (FOM) of the Facility Operations Division (FO), U. S. Army Construction Engineering Research Laboratory (CERL). The CERL Principal and Associate Investigators are Dr. M. Y. Shahin and Ms. F. M. Rozanski, respectively.

Special acknowledgment is given to Mr. R. Larson of CERL, who was involved in the initial development of the computerized pavement data base.

COL J. E. Hays is Commander and Director of CERL and Dr. L. R. Shaffer is Technical Director. Dr. E. L. Marvin is Chief of FOM and Mr. R. B. Blackmon is Chief of FO.



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TABLES (cont'd)

AUTOMATED PAVEMENT MAINTENANCE AND REPAIR MANAGEMENT SYSTEM

1 INTRODUCTION

Background

Military installations invest large sums of money each year for pavement maintenance and repair. To help facilities engineering personnel achieve maximum benefits from dollars spent, a pavement maintenance and repair management system has been developed and documented in U. S. Army Construction Engineering Research Laboratory (CERL) Technical Information Pamphlets C-48[1] and C-49.[2]

The system described in these publications provides card formats for manually recording relevant pavement information, procedures for performing pavement inspections, guidelines for establishing maintenance requirements and priorities, and recommended formats for work planning.

Although the manual system is justified from a cost/benefit standpoint,* the large amount of information that must be stored for any typical installation pavement network requires that considerable time and manpower be expended in retrieving data from the manually filed pavement record cards. Consequently, a pavement management system providing automated data storage and retrieval procedures is needed.

Purpose

The purpose of this report is to present a computerized pavement maintenance and repair management system designed to aid facilities engineers in obtaining the following benefits:

1. Prevention of over- or undermaintenance of pavements.

2. More efficient utilization of funds

3. More efficient scheduling of maintenance activities

4. Rapid retrieval of pavement information, especially work requirements for submission to the shop or contractor

5. Documentation of pavement performance.

Organization of Report

Chapter 2 provides an overview of the computerized pavement maintenance and repair management system. Chapter 3 describes the data structure and the kind of data stored in the data base. Chapter 4 presents the data input forms and instructions for data input. Chapter 5 presents the available report outputs and their associated report generation options, and Chapter 6 provides instructions for using a computer terminal to generate the report outputs. Chapter 7 presents guidelines for implementing the computerized system at an installation.

2 SYSTEM OVERVIEW

The computerized pavement maintenance and repair management system, called PAVER, is based on the guidelines presented in CERL Technical Information *Pamphlet C-49. PAVER consists of:*

1. A data base for storage of relevant pavement information

2. A set of forms used to collect pavement data and enter it into the data base

3. A set of report-generator programs to retrieve information from the data base and present it in usable format.

PAVER is designed to be operated and controlled by a member of the Directorate of Facilities Engineering (DFAE), who will be called the "pavement engineer" in this discussion. The pavement engineer uses a typewriter-like computer terminal in his/her office to input and retrieve information from the PAVER data base. Figure 1 illustrates how the pavement engineer can use PAVER in managing pavement maintenance and repair. This process is described briefly in the following paragraphs.

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[1] M. Y. Shahin, M. I. Darter, and F. M. Rozanski, *Pavement Inspection Reference Manual*, Technical Information Pamphlet C-48/ADA017329 (U. S. Army Construction Engineering Research Laboratory [CERL], September 1975).

[2] M. Y. Shahin, M. I. Darter, F. M. Rozanski, and R. Stark, *Development of an Installation Surfaced Area Maintenance and Repair Management System*, Technical Information Pamphlet C-49/ADA017328 (CERL, September 1975).

*Manual systems have been used at some installations for several years.

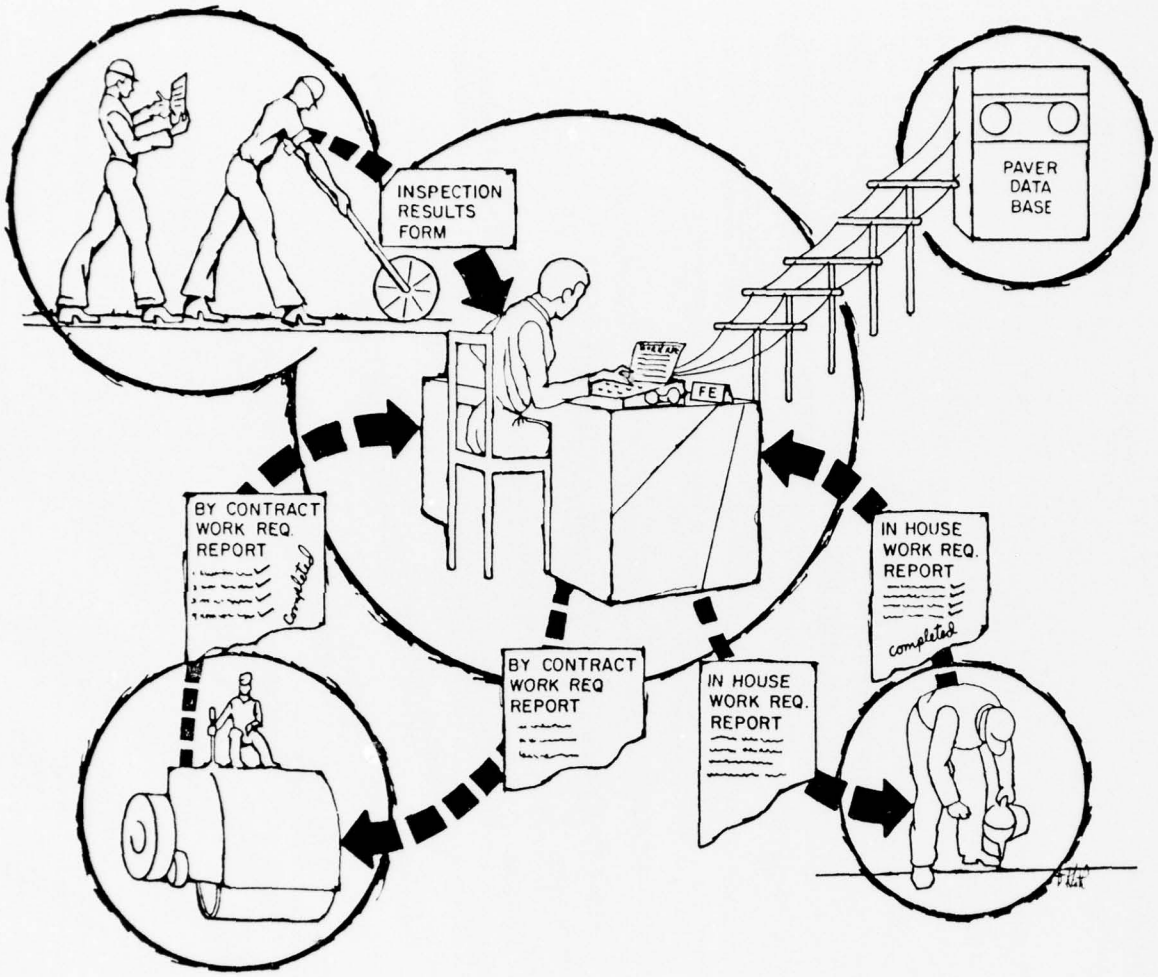


Figure 1. Use of PAVER by pavement engineer.

1. Pavement inspections are performed by trained members of the Roads and Grounds Branch. As each section is inspected, the results are entered on a PAVER Inspection Results Input Form and presented to the pavement engineer.

2. The pavement engineer determines work requirements for the pavement section based on the inspection results and any other information about the pavements section he/she may wish to retrieve from the data base. (This may include a history of past repairs performed on the pavement section, structural layering data, traffic information, previously defined work requirements, or a cost comparison between various maintenance and repair (M&R) alternatives.) The inspection results and the newly defined work requirements for the pavement section are then entered into the data base via the computer terminal.

3. The pavement engineer may generate a listing of proposed work from the data base at any time. The list may be restricted to a particular type of work, location within the installation, priority level, or manner of accomplishment (in-house or by contract). The work assignments are then routed to the shop or a contractor through the appropriate channels.

4. When work is completed, the shop or the contractor returns the work list to the pavement engineer with any necessary revisions in work quantity and cost.

5. Final data on work completed (for both work performed in-house and by contract) are entered into the data base. The computer automatically deletes the corresponding work requirement from the list of work to be done and adds the work completed to the work history.

The only information which must be stored in the PAVER data base to make the system operational is pavement identification, inspection results, work requirements, and work-completed data. However, there is room in the PAVER data base for other relevant information such as pavement shoulders, drainage, structural layering, and traffic survey results. Additionally, PAVER can perform a present worth economic analysis to compare various methods of accomplishing needed work. These aids will enable the pavement engineer to make informed pavement maintenance management decisions.

3 PAVER DATA BASE

The PAVER data base is a custom-designed data structure defined on a commercially available computer data base management system called System 2000. The data base is presently operating on a CDC 6700 computer located in Washington, D. C.

Data Groups

The PAVER data base consists of data groups which correspond closely to the record cards in the manual record-keeping system described in CERL Technical Information Pamphlet C-49. Figure 2 shows the data groups; a brief description of each data group is presented below.

Facility Identification—identifies all the facilities in the pavement network and stores information that applies to an entire pavement facility. "Facility" is defined as an easily identifiable entity such as a particular street, parking lot, runway, taxiway, apron, helipad, or storage area.

Section Identification—identifies all the pavement sections of each facility and stores information that applies to an entire pavement section. Facilities are divided into sections to account for variances in pavement characteristics such as pavement structure and traffic volume. Pavement sections are treated as separate entities in terms of record keeping and work planning.

Shoulders—describes the shoulder characteristics of the pavement section. Shoulder data are required in order to plan shoulder maintenance and repair and to observe the effect various types of shoulders have on pavement performance.

Drainage—describes the surface and subsurface drainage provisions of the pavement section. Drainage data are useful in determining the cause of pavement failure and in making comparisons between the performance of various drainage systems.

Secondary Structures—describes and locates structures such as manholes, bridges, and culverts within the pavement section. This information is useful because modification of secondary structures can be an important factor in developing cost estimates for various repair methods.

Condition History—provides a history of the overall condition ratings of each pavement section as determined through periodic inspections. The effectiveness of work performed in the past as well as the present condition of the pavement section can be determined from the data stored in this group.

Sample Unit Identification—identifies the smaller units into which the section is divided for inspection purposes. With these divisions, it is possible to use a sampling technique to inspect a portion of the pavement section and extrapolate the results over the entire pavement section. It is also possible to establish a pavement condition profile along the section.

Pavement Distress—provides a record of the quantities and severities of pavement distresses found during periodic inspections. Distress data from current inspections are used for determining work needs. Recurring distresses indicate whether the repair methods used were adequate.

Work Record—maintains a record of both work that needs to be done and past work on each pavement section. When a work requirement is first defined, preliminary job description and cost estimate data are stored in the work record group. When the job has been completed, the date completed is stored, estimated cost is changed to actual cost, and other data are added or changed as required. The amended work requirement thus becomes a permanent record of work performed.

Work requirements are retrieved from the data base in order to plan, budget, and schedule M&R activities. Work-completed data combined with condition history data are used to identify pavement sections that fail frequently due to structural inadequacies and to provide information needed to analyze the cost-effectiveness of various maintenance and repair strategies.

Pavement Structure—describes each layer in the structure of the pavement section. Structural information can aid in the choice of the best maintenance or repair alternative.

Layer Material Properties—provides a record of material properties of pavement layers. The properties furnish specific information about the material in the layers of the pavement structure and can help determine when pavement failure is caused by structural inadequacies.

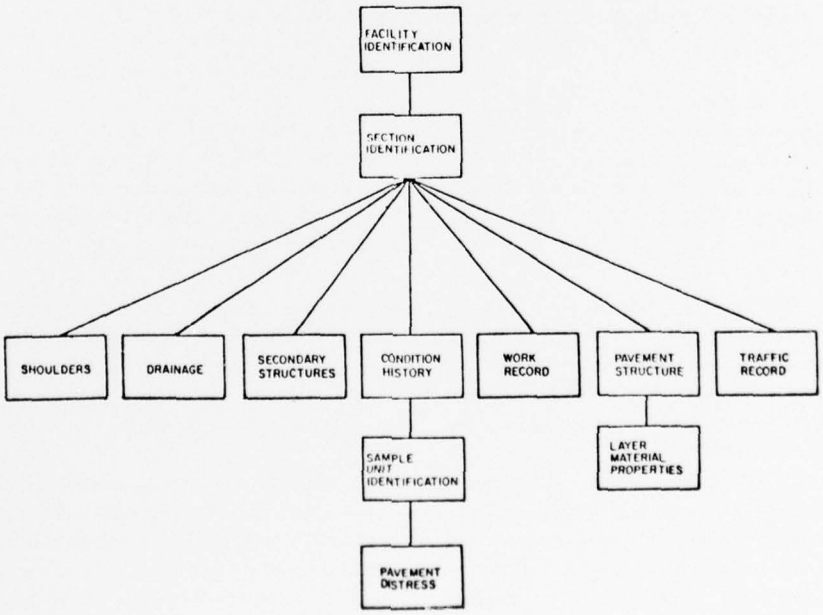


Figure 2. PAVER data structure.

Traffic Record—provides a record of types and volumes of traffic utilizing the pavement section as determined through periodic traffic surveys. Traffic information is used to indicate when a pavement failure is due to excessive loading, to assign priorities for future work based on pavement utilization, and to schedule M&R activities so as to minimize interference with traffic flow.

Tree Structure

The data groups are linked together to form the tree structure shown in Figure 2. For each occurrence of a set of data in a data group, there may be several sets of associated data in a descendent data group. This can best be explained by the following example, which traces the data stored for a facility—Pershing Avenue—down one path of the tree. The set of data describing Pershing Avenue as a facility is stored in the facility identification group. Pershing Avenue has three sections, so there are three sets of data in the section identification group connected to the Pershing Avenue data in the facility identification group. Section 1 of Pershing Avenue has had six condition surveys, so there are six data sets in the condition history group connected to Section 1 of Pershing Avenue. Ten sample units were inspected during the 1971 condition survey, so there are ten data sets connected to the 1971 condition survey of Section 1 of Pershing Avenue. Four distress types were found in Sample Unit #1, so there are four data sets connected to Sample Unit #1 of the 1971 condition survey of Section 1 of Pershing Avenue. Data stored in the other groups are related similarly.

The purpose of storing data in this structured manner is to permit retrieval of information based on its connection to other data in the data base.

4 DATA INPUT

Mode of Data Input

Data are entered into the PAVER data base via keypunched cards that are fed into a card reader attached to a desk-size terminal. The terminal transmits data to the computer via telephone lines. The format of the data on the keypunched cards is specified on the input forms described in this chapter. Guidelines for filling out the forms are also provided.

General Instructions

The following general instructions apply to all input forms. Specialized input instructions and examples of each form are presented in the next section.

Format

The two types of format for data input are numeric and alphanumeric. In the numeric format, the data must contain **only** numbers. No letters or other nonnumerical characters can be used. Decimal points **cannot** be used unless preprinted on the input form. In the alphanumeric format, the data can consist of any combination of letters, numbers, or special characters (such as / & ' + - . , " ( ) $ =). In an alphanumeric field, numbers such as 01 and 1 are not recognized to be the same number by the computer. Consequently, it is best to follow the rule that alphanumeric fields be zero filled.

Fields that must contain numeric data are designated N on the input forms. All other fields may contain alphanumeric data.

Justifications

All data in alphanumeric format should be left-justified; i.e., the data should begin in the leftmost column in the field. Any blank columns will be to the right of the field. All data in numeric form should be right-justified, i.e., end in the rightmost column of the field. Any blank columns will be to the left of the field. Figure 3 illustrates justification of both alphanumeric and numeric data formats.

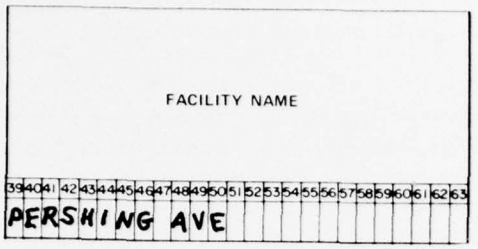
Dates

When recording dates, the following rules apply. Months, days, and years should each be entered as **two**-digit numbers. Figure 4 shows how the date May 4, 1976 should be entered.

Also, if the exact date is not known, either all the columns should be left blank or an approximate date should be entered. Do not leave some of the columns blank and fill in others, since incomplete dates will cause error messages.

Zeroes

The number "zero" and the letter "O" are on two different keys on the keypunch machine and desk terminal. If these two characters are confused, the computer may not accept the data being input or may not output the data being requested. To differentiate be-



a. Alphanumeric format—left-justified field.

b. Numeric format—right-justified field.

Figure 3. Justification of alphanumeric and numeric data formats.

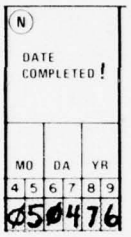


Figure 4. Example date entry.

tween them, the number "zero" should be written "Ø" and the letter "O" should be written "O" on all input forms.

Repeated Entries

In some cases, the same data may need to be repeated down a field for several lines. To avoid repeatedly entering the same data, the user may enter the data on the first line and then draw a wavy line down the field to the line where the data entry changes (Figure 5). This will indicate to the keypunch operator that the data should be duplicated for each of these lines.

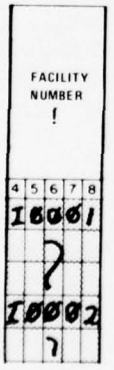


Figure 5. Example indication of repeated data.

Critical Fields

Critical fields are fields which **must** be filled each time data are entered. The data entered in the critical fields determine where in the PAVER data base data are to be added, changed, or deleted. The symbol "!" is used on the input forms to designate critical fields.

Adding Data. When data are entered for the first time, the letter "A" should be entered in the ADD/CH/DEL field, and the critical fields should be filled in. As many of the other fields as possible should contain data, though none are necessary for successful execution of the input program. The user should remember that the output reports will only contain as much information as is recorded on the input forms. An example of data being added is given in Figure 6 in the **PAVER Input Forms** section.

Deleting Data. Previously entered data are deleted from the data base by entering a "D"* in the ADD/CH/DEL field and entering the appropriate data in the critical fields. No other fields should be filled in. An example of data being deleted is given in Figure 13 in the **PAVER Input Forms** section. If the user wishes to delete part but not all of the data in a line, the ADD/CH/DEL code "C" should be used (see next paragraph).

Changing Data. Previously entered data are changed by entering a "C" in the ADD/CH/DEL field, entering the appropriate data in the critical fields, and entering the corrected data in those fields where revision is required. Fields that require no revision should be left blank. The change code "C" can also be used when the user wishes to delete less than a complete line of data.

*The user should **always** check the detailed input instructions before entering a "D" on any input form. In some cases, vast amounts of data may be lost.

This is accomplished by entering a "C" in the ADD/CH/DEL field, entering the appropriate data in the critical fields, and entering the symbol "*" in the first column of those fields for which data are to be deleted. Figure 13 illustrates such a deletion.

Since lines of data are identified in the data base by the values in the critical fields, the data previously entered in a critical field cannot be changed by entering an ADD/CH/DEL code of "C" and substituting corrected data. Doing so will result in an error message. The only way critical field data can be changed is to completely delete the line using a code "D" and resubmit the new data as if they had never existed by using a code "A." An example of changing a critical field is shown in Figure 8. (WARNING: **Deleting lines on the Facility Identification or Section Identification Input Forms will also delete all other data pertaining to the pavement sections. Always check detailed input instructions before using code "D."**)

Illegal Words

Because certain words are part of the System 2000 command language, errors in report generation occur if they also appear as data.* Since illegal words are most likely to occur in facility names and locations of physical features, care should be taken to avoid them when entering this type of data. A "word" is defined as a string of characters preceded by one or more blanks and followed by one or more blanks. Illegal words embedded in other words are acceptable. For example, although the word "AND" is illegal, the word "SAND" is legal. The illegal words are:

AND (substitute &)

AT

BY

EQ

EXIST, EXISTS, EXISTING

FAIL, FAILS, FAILING

GE

GT

HAS, HAVE, HAVING

LE

LT

NE

NOT

OR (substitute /)

SAME

SPAN, SPANS, SPANNING

WHERE.

*It is acceptable to use illegal words in "Comments."

Paver Input Forms

Fifteen forms have been designed for inputting data in the PAVER data base. They are used at various times with varying frequencies.

The Facility Identification and Section Identification Input Forms are generally used only once for each facility and section. The forms are filled out at the time the pavement network is divided into facilities and sections.

The Inspection Results, Work Required, Work Completed, and Work Comments Input Forms are the most frequently used. They are completed after pavement inspections, determination of M&R requirements, and performance of work.

The Traffic Survey Input Form is used every few years, as traffic counts are performed on each pavement section.

The Shoulders, Drainage, Pavement Structure, Layer Material Properties, and Secondary Structure Input Forms are completed once for each section when data are obtained. They are also filled when changes occur.

The following sections describe use of the forms and present guidelines for completing them.

Facility Identification Input Form

Use. The Facility Identification Input Form is used to identify each pavement facility in the pavement network. The computer will not accept data about a facility entered by the other forms unless the facility is first entered into the data base on the Facility Identification Input Form. A separate line of the form should be used for each facility on the installation.

Input Instructions. Table 1 presents the input instructions for the Facility Identification Input Form, and Figure 6 shows an example of facility data being entered into the data base.

Table 1
Input Instructions for Facility Identification Input Form

Field	Format	Columns	Special Instructions
INSTALLATION NUMBER!	numeric	3-7	Preprinted
INSTALLATION NAME	alphanumeric	8-31	Preprinted
AD/CH/DEL!	alphanumeric	32	Enter "D" **only if a facility is to be completely deleted from the data base. "D" will delete all sections of the facility and all data pertaining to the sections such as condition surveys, work records, etc.**
TYPE CONSTRUCTION CODE*	alphanumeric	33	Enter one of the following to indicate the planned life of the facility: P = permanent (planned life of over 25 years) S = semipermanent (planned life of 5 to 25 years) T = temporary (planned life of under 5 years)
FACILITY NUMBER!**	alphanumeric	34-38	None
FACILITY NAME	alphanumeric	39-63	Standardize spellings and abbreviations in facility names. When commands are used to retrieve data from the data base by facility name, the facility name must be spelled exactly as it is spelled on this input form.
FACILITY USE	alphanumeric	64-70	Enter one of the following: ROADWAY PARKING RUNWAY TAXIWAY APRON HELIPAD If none of these apply, specify the facility use.
NUMBER OF SECTIONS	numeric	71-72	Enter total number of sections in the facility.
FACILITY AREA	numeric	73-79	Enter total area of facility in square yards.

*This entry must match the first character of the IFS facility number (see Appendix A).

**This entry must match characters 2 through 6 of the IFS facility number.

FACILITY IDENTIFICATION

TYPE CONSTRUCTION CODE
P = PERMANENT
S = SEMI-PERMANENT
T = TEMPORARY

FACILITY USE

ROADWAY	TAXIWAY
PARKING	APRON
RUNWAY	HELIPAD
	OTHER – SPECIFY

FORM ID	INSTALLATION NUMBER (N)	INSTALLATION NAME	ADD/CH/DEL	TYPE CONST CODE	FACILITY NUMBER	FACILITY NAME	FACILITY USE	NUMBER OF SECTIONS (N)	FACILITY AREA (SY) (N)
01	36924	FT SCOTT	A	P	00236	PERSHING AVE	ROADWAY	3	23184
					00237	5TH ST	?	2	1747
					00238	BUTNER ST	?	2	3976
					00239	GOLF CLUB PARKING	PARKING	1	1349
					00240	APRON A	APRON	1	58310

KEYPUNCH OPERATOR
DUPLICATE COLUMNS
1-31 ON ALL CARDS

17

Figure 6. Example facility data input.

Section Identification Input Form

Use. This form is used to identify all the sections in each pavement facility and enter basic information about them into the data base. The computer will not accept data about a pavement section from any other input form unless the section is first entered into the data base using the Section Identification Input Form. Sections of more than one facility can be entered on one form.

Input Instructions. Table 2 gives the input instructions for the Section Identification Input Form. Figure 7 shows an example of pavement section data being added to the data base. Notice that the beginning and ending points of sections are specified so that it is clear whether the pavement at the intersection belongs to the specified pavement section or to the cross street.

Table 2
Input Instructions for Section Identification Input Form

Field	Format	Columns	Special Instructions
ADD/CH/DEL!	alphanumeric	3	Enter "D" **only if all data about a pavement section, including condition surveys, work records, etc., are to be deleted.** Facility identification data and data pertaining to other sections of the same facility will not be affected.
FACILITY NUMBER!	alphanumeric	4-8	None
SECTION NUMBER!	alphanumeric	9-10	None
ZONE*	alphanumeric	11-14	Enter letter-number combination that identifies zone which contains the greatest part of the pavement section
SECTION LENGTH	numeric	15-20	If the section is roughly rectangular, enter its length in linear feet. Leave blank for irregularly shaped sections.
SECTION WIDTH	numeric	21-22	If the section is roughly rectangular, enter its width in linear feet. Leave blank for irregularly shaped sections.
SECTION AREA	numeric	25-31	If length and width have not been entered (i.e., if the section is irregularly shaped), enter the section area in square yards. Also enter section area if the area is not equal to length times width. Leave blank if area is equal to length times width.
FAMILY HOUSING	alphanumeric	32	Enter "Y" if the section is funded through family housing funds; enter "N" otherwise.
PAVEMENT RANK	alphanumeric	33	Enter one of the following: P = primary S = secondary T = tertiary X = other (patrol, etc.) N = not applicable
SURFACE TYPE	alphanumeric	34-36	Enter one of the following: AC = asphalt concrete PCC = portland cement concrete ST = surface treatment GR = gravel X = other
SLAB WIDTH	numeric	37-39	If the surface type of the section is concrete, enter the predominant width and length of an individual slab in linear feet. If the surface type is not concrete, leave blank.
SLAB LENGTH	numeric	40-42	
SECTION BEGINS	alphanumeric	43-61	Indicate the beginning and ending points of the section by relating them to some physical feature.
SECTION ENDS	alphanumeric	62-80	

*See page 70.

SECTION IDENTIFICATION

FAMILY HOUSING

Y = YES
N = NO

PAVEMENT RANK

P = PRIMARY
S = SECONDARY
T = TERTIARY
X = OTHER
N = NOT APPLICABLE

SURFACE TYPE

AC = ASPHALT
ST = SURFACE TREATMENT
PCC = CONCRETE
GR = GRAVEL
X = OTHER

FORM ID	ADD/CH/DEL	FACILITY NUMBER	SECTION NUMBER	ZONE	(N) SECTION LENGTH (LF) (LEAVE BLANK FOR IRREGULARLY SHAPED SECTIONS)	(N) SECTION WIDTH (LF)	(N) SECTION AREA (SY) (LEAVE BLANK IF LENGTH & WIDTH ARE ENTERED)	FAMILY HOUSING	PAVEMENT RANK	SURFACE TYPE	(N) SLAB WIDTH (LF) (PCC ONLY)	(N) SLAB LENGTH (LF)	SECTION BEGINS	SECTION ENDS
02	A	ØØ236	Ø1	E1Ø	6158	31		N	P	AC			E EDGE OF WILSON	CENTER OF HAGOOD
02		?	Ø2	E1Ø	2Ø78	2Ø		N	P	AC			CENTER OF HAGOOD	BLDG 256
02		?	Ø3	E11	888	2Ø		Y	S	AC			BLDG 256	E EDGE OF MADISON
02		ØØ237	Ø1	85	624	16	1125	Y	S	PCC	8	15	S EDGE OF JACKSON	N EDGE OF PATTON
02		?	Ø2	C5	319	18		Y	S	PCC	10	15	S EDGE OF PATTON	N EDGE OF PERSHING
02		ØØ238	Ø1	R12			1344	N	A	C			S OF LINCOLN AVE	N OF BLDG 1256
02		ØØ239	Ø1	K18	997	526	5831	Ø	N	AC			E OF TAXIWAY 3	S OF RUNWAY 3
02														
02														
02														
02														
02														
02														
02														

Figure 7. Example section data input.

Shoulders Input Form

Use. The Shoulders Input Form is used to record the shoulders of a pavement section. A new line of the input form is used each time the shoulder type changes along the section. The shoulder data for more than one pavement section can be entered on the same form.

Input Instructions. Table 3 presents the input instructions for the Shoulders Input Form. The first line in Figure 8 shows the transaction that takes place when a change is made to a non-critical field, in this case shoulder length. The second and third lines show the transaction that takes place when a change is made to a critical field. The shoulder code is being changed to indicate that the previously unpaved shoulder is now paved. Since the shoulder code is a critical field, an ADD/CH/DEL code of "C" cannot be used. The code "D" must be used to delete the unpaved shoulder data (notice that only the critical fields are filled). The paved shoulder data are then added with the ADD/CH/DEL code "A."

Table 3
Input Instructions for Shoulders Input Form

Field	Format	Columns	Special Instructions
ADD/CH/DEL!	alphanumeric	3	None
FACILITY NUMBER!	alphanumeric	4-8	None
SECTION NUMBER!	alphanumeric	9-10	None
SHOULDER CODE!	alphanumeric	11-12	Enter one of the following: SØ = no shoulder S1 = paved, wide enough for parking S2 = paved, too narrow for parking S3 = unpaved, wide enough for parking S4 = unpaved, too narrow for parking
SHOULDER LOCATION!	alphanumeric	13-41	Describe the location within the section of the shoulder type indicated by the shoulder code.
SHOULDER LENGTH	numeric	42-47	Enter length in feet of the shoulder type indicated by the shoulder code.
COMMENTS	alphanumeric	48-80	Enter any additional comments about the shoulder.

SHOULDERS

SHOULDER CODES

- S0 = NO SHOULDER
- S1 = PAVED, WIDE ENOUGH FOR PARKING
- S2 = PAVED, TOO NARROW FOR PARKING
- S3 = UNPAVED, WIDE ENOUGH FOR PARKING
- S4 = UNPAVED, TOO NARROW FOR PARKING

FORM ID	ADD/CH/DEL	FACILITY NUMBER	SECTION NUMBER	SHOULDER CODE	SHOULDER LOCATION	(N) SHOULDER LENGTH (LF)	COMMENTS
03	C	00356	025	1	SOUTH SIDE, ELM TO BLDG 631	589	
03							
03	D	00039	01	S3	EAST SIDE		
03	A	00039	01	S1	EAST SIDE	2982	PAVED 4/18/77
03							
03							
03							
03							
03							
03							
03							
03							
03							

Figure 8. Example of changing shoulder data.

7

Drainage Input Form

Use. The Drainage Input Form is used to describe the drainage provisions for one pavement section. A separate form must be used for each pavement section. If necessary, a section may be continued on another form. A separate line is used to record each type of drainage provision in the pavement section. There is room on the bottom of the form for any additional comments about the drainage provisions.

Input Instructions. Tables 4 and 5 give the input instructions for the top and bottom portions of the Drainage Input Form, respectively. Figure 9 shows an example of a completed Drainage Input Form.

Table 4
Input Instructions for Top of Drainage Input Form

Field	Format	Columns	Special Instructions
ADD/CH/DEL!	alphanumeric	3	None
FACILITY NUMBER!	alphanumeric	4-8	Need only be entered on first line of each input form.
SECTION NUMBER!	alphanumeric	9-10	Need only be entered on first line of each input form.
DRAINAGE CODE!	alphanumeric	11-13	Enter one of the following or leave blank if none applies: SUB = subsurface drainage DØØ = no surface drainage provision DØ1 = open ditch (fill) 0 to 1 ft (0 to 0.3 m) deep DØ2 = open ditch (fill) 1 to 2 ft (0.3 to 0.6 m) deep DØ3 = open ditch (fill) 2 to 3 ft (0.6 to 0.9 m) deep DØ4 = open ditch (fill) 3 to 4 ft (0.9 to 1.2 m) deep DØ5 = open ditch (fill) over 4 ft (1.2 m) deep DØ6 = open ditch (cut) 0 to 1 ft (0 to 0.3 m) deep DØ7 = open ditch (cut) 1 to 2 ft (0.3 to 0.6 m) deep DØ8 = open ditch (cut) 2 to 3 ft (0.6 to 0.9 m) deep DØ9 = open ditch (cut) 3 to 4 ft (0.9 to 1.2 m) deep D1Ø = open ditch (cut) over 4 ft (1.2 m) deep D11 = curb and gutter, inlet in curb D12 = curb and gutter, inlet in gutter D13 = curb and gutter, inlet in curb and gutter D14 = curb and gutter, other
DRAINAGE DESCRIPTION	alphanumeric	14-38	Enter description of drainage provision if none of the drainage codes applied or if the drainage code entered was "SUB." If drainage code beginning with "D" was entered, leave blank.
DRAINAGE LOCATION!	alphanumeric	39-68	Enter the location of the drainage provision within the section.
DRAINAGE LENGTH	numeric	69-74	Enter the length in feet of the drainage provision, if applicable.

Table 5
Input Instructions for Bottom of Drainage Input Form

Field	Format	Columns	Special Instructions
ADD/CH/DEL!	alphanumeric	3	None
COMMENTS	alphanumeric	12-51	Enter any additional comments about the drainage provisions for the section. Comments may be two lines long if necessary.

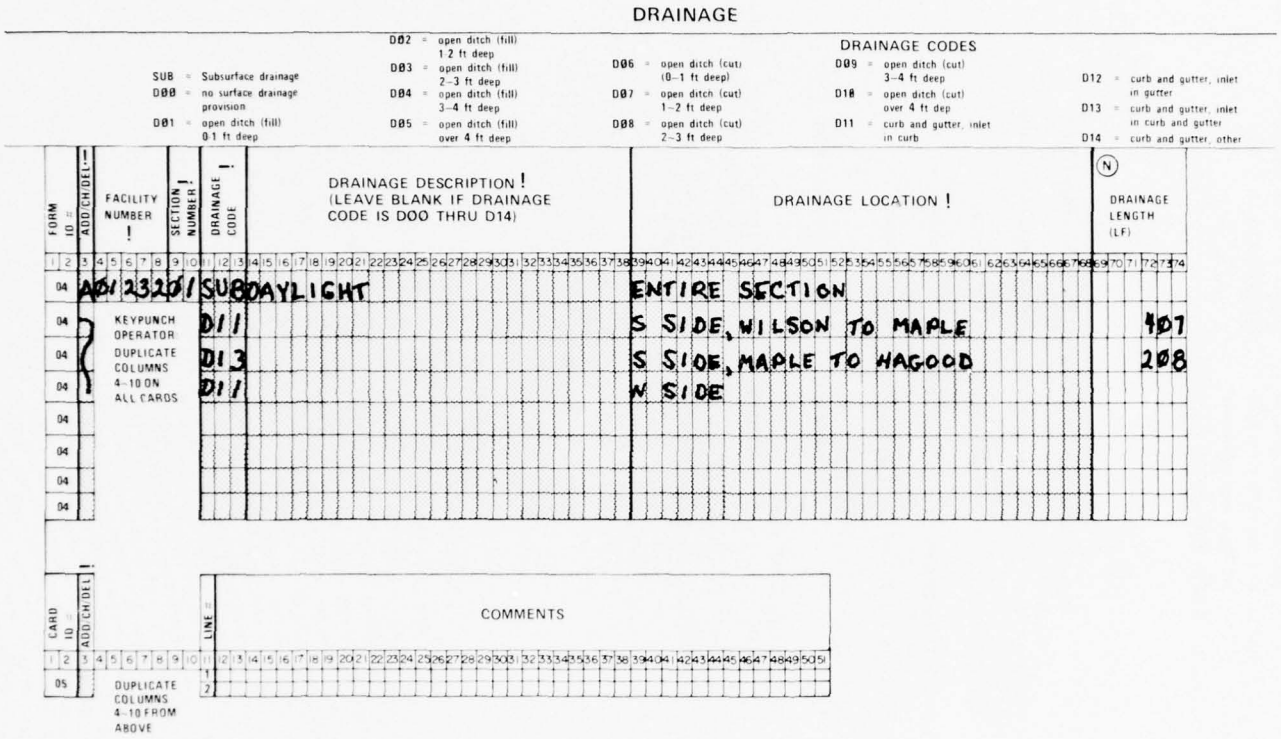


Figure 9. Completed Drainage Input Form.

Secondary Structures Input Form

Use. This form is used to record any secondary structures such as manholes, bridges, and culverts which should be considered when the pavement section is being repaired. A separate line is used for each structure. The secondary structures for more than one pavement section can be recorded on the same input form.

Input Instructions. Table 6 presents the input instructions for the Secondary Structures Input Form. Figure 10 is an example of a completed Secondary Structures Input Form.

Table 6
Input Instructions for Secondary Structures Input Form

Field	Format	Columns	Special Instructions
ADD/CH/DEL	alphanumeric	3	None
FACILITY NUMBER!	alphanumeric	4-8	None
SECTION NUMBER!	alphanumeric	9-10	None
SECONDARY STRUCTURE TYPE!	alphanumeric	11-27	Enter description of structure.
SECONDARY STRUCTURE LOCATION!	alphanumeric	28-56	Describe location of structure within pavement section.
COMMENTS	alphanumeric	57-80	Enter any additional comments about structure.

SECONDARY STRUCTURES

FORM ID	ADD/CH/DEL	FACILITY NUMBER	SECTION NUMBER	SECONDARY STRUCTURE TYPE	SECONDARY STRUCTURE LOCATION	COMMENTS
06	A	00369	01	MANHOLE	350 FT W OF ELM ST	
06	A	00380	02	CULVERT	NEAR BLDG 520	
06	A	00421	01	MANHOLE	50 FT E OF RR CROSSING	
06						
06						
06						
06						
06						
06						
06						
06						
06						

Figure 10. Completed Secondary Structures Input Form.

Inspection Results Input Form

Use. The Inspection Results Input Form is used to enter the results of the inspection in the PAVER data base. (Appendix B contains guidelines for performing inspections and completing field data shields.) Separate Inspection Results Input Forms are used for asphalt and concrete surfaced pavements and for each pavement section. In the case of unpaved sections, either inspection form (asphalt or concrete) may be used. Only columns 1 through 21 should be filled in.

The quantities of each severity level of each distress recorded on the field data sheets are totaled for each sample unit, and this information is entered on the Inspection Results Input Form along with the general condition rating of the pavement section. A separate line should be used for recording the inspection results for each sample unit. Each line has six distress fields. A separate field should be used to record the total quantity of each severity level of each distress type found in the sample unit. As many fields as necessary may be used. If a sample contains more than six distress type/severity combinations, repeat the sample unit number on the next line and continue entering data. If no distress occurs in the sample unit, enter the sample unit number and leave the rest of the line blank. The inspection data for a section may be continued on another form, if necessary.

Input Instructions. Since there are few differences between the inspection forms for concrete and asphalt pavements, the instructions for completing the two forms are presented together. The instructions for completing the top, middle, and bottom portions of the two forms are given in Tables 7, 8, and 9, respectively. Figure 11 is an example of a completed asphalt pavement inspection form and Figure 12 shows a completed concrete pavement inspection form.

Table 7
Input Instructions for Top Portion of Inspection Results Input Forms

Field	Format	Columns	Special Instructions
Form ID#	*numeric*	1-2	**ASPHALT** Circle 07 if this is not a continuation sheet. Circle 08 if this is a continuation sheet. **CONCRETE** Circle 10 if this is not a continuation sheet. Circle 11 if this is a continuation sheet.
INSPECTION DATE!	numeric	3-8	None
ADD/CH/DEL!	alphanumeric	16	"D" deletes **all inspection data for the pavement section inspection performed on the specified inspection date. This field must be left blank on continuation sheets.**
SECTION CONDITION	numeric	17-21	In each column, enter one of the following: 1 = good 2 = fair 3 = poor
TOTAL NUMBER OF SAMPLES IN SECTION	*numeric*	22-24	*Enter the total number of sample units in the section, including both sample units that were surveyed and sample units that were not surveyed.* **This field must be left blank on continuation sheets.**

Table 8
Input Instructions for Middle Portion of Inspection Results Input Forms

Field	Format	Columns	Special Instructions
ADD/CH/DEL!	alphanumeric	16	"D" deletes **all** data for the specified sample unit.
SAMPLE UNIT NUMBER!	alphanumeric	17-19	Enter the sample unit number for each sample unit that was inspected.
SAMPLE TYPE	alphanumeric	20	Enter "A" for additional sample units. Enter "R" or leave blank for random sample units. (Definitions of random and additional are given in Appendix B.)
AREA OF SAMPLE (asphalt) or NUMBER OF SLABS IN SAMPLE (concrete)	numeric	21-25	**ASPHALT** Enter area in square feet of each sample unit. **CONCRETE** Enter number of slabs in each sample unit.
DISTRESS CODE!	numeric	33-34 42-43 51-52 60-61 and 69-70	Enter the distress codes from the field data sheet for the distress types found in the sample. **This is critical only when distress data are being changed.**
TOTAL QUANTITY (asphalt) or NUMBER OF SLABS (concrete)	numeric	35-40 44-49 53-58 62-67 and 71-76	For each sample, add the quantities or number of slabs of each severity level of each distress type on the field data sheet and enter the totals.
SEVERITY!	alphanumeric	41 50 59 68 and 77	Enter one of the following: L = low M = medium H = high **This field is critical only when distress data are being changed.**

Table 9
Input Instructions for Bottom Portion of Inspection Results Input Forms

Field	Format	Columns	Special Instructions
ADD/CH/DEL!	alphanumeric	16	None
COMMENTS	alphanumeric	18-57	Enter any additional comments about the inspection of the specified pavement section. The comments may be two lines long if necessary.

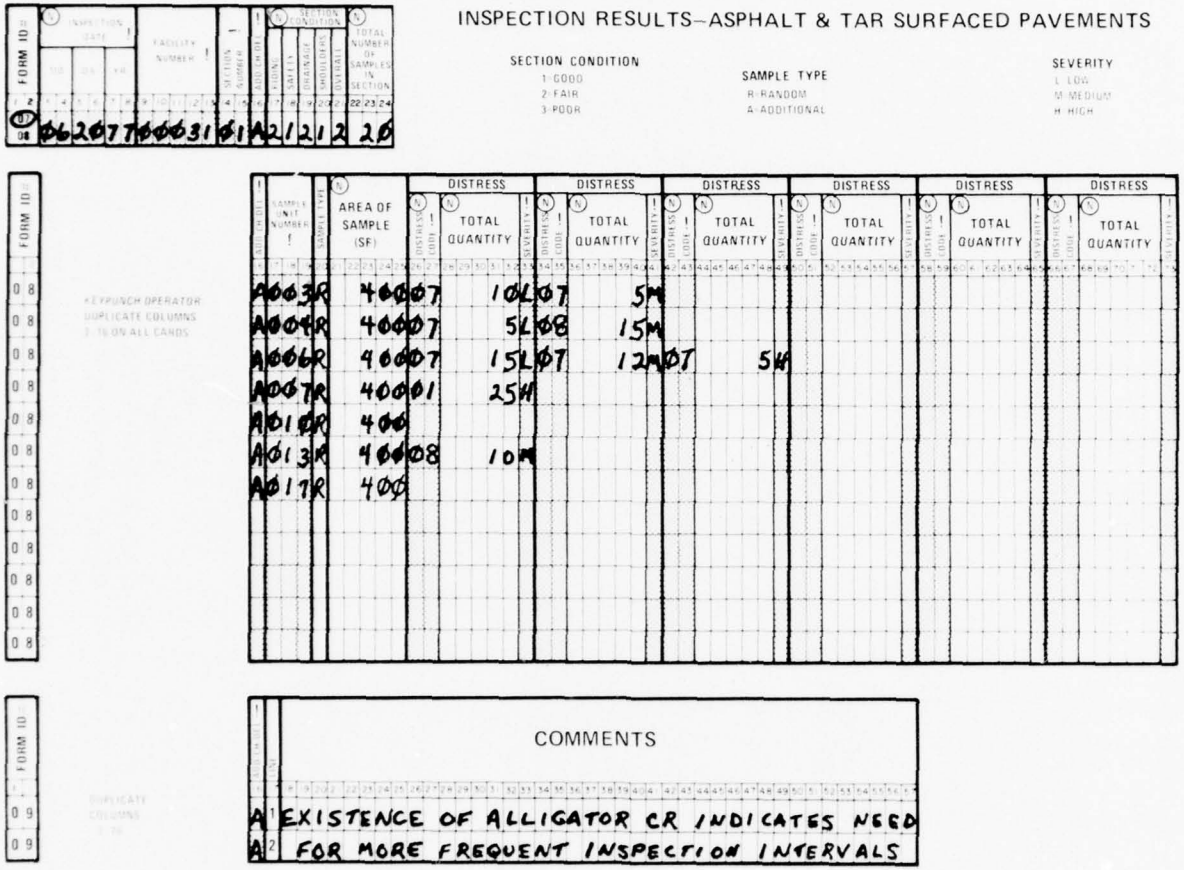


Figure 11. Example completed Inspection Results Input Form for an asphalt pavement section.

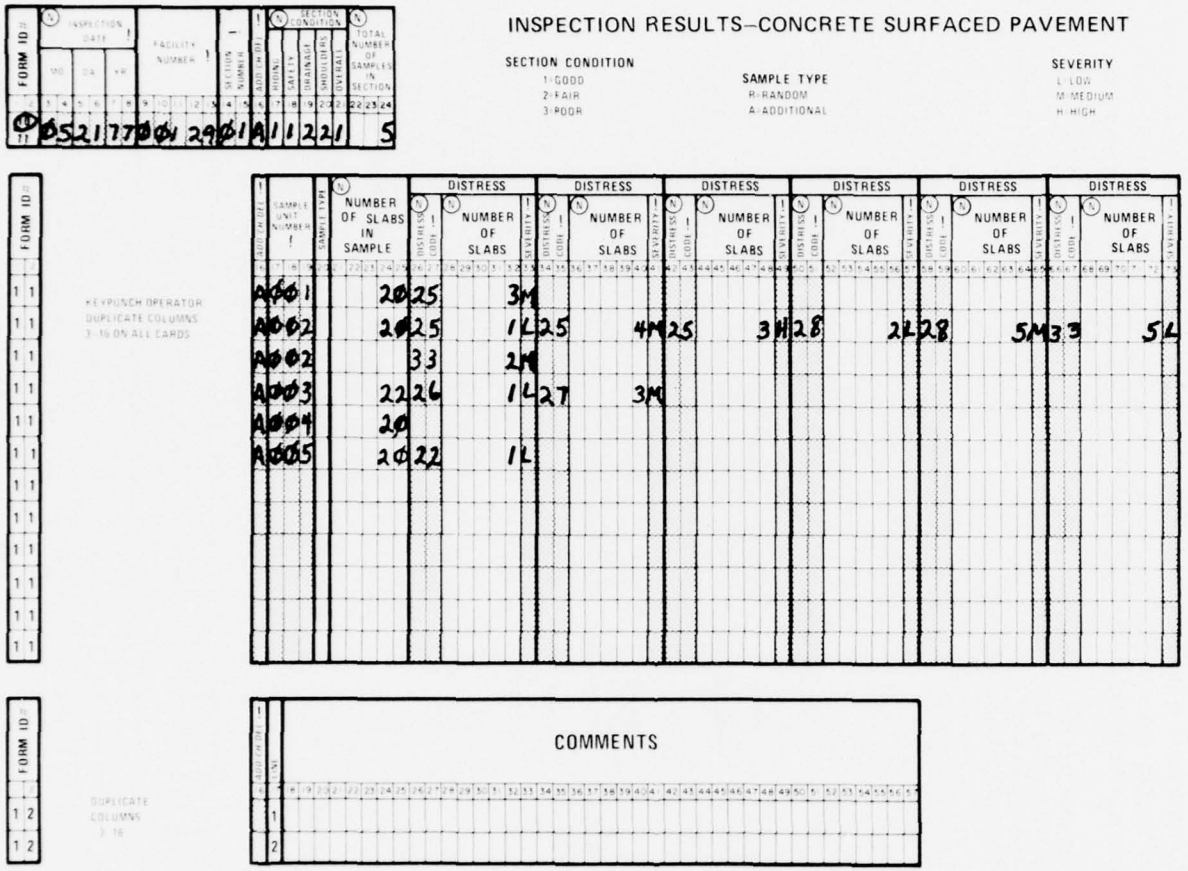


Figure 12. Example completed Inspection Results Input Form for a concrete pavement section.

Work Requirements Input Form

Use. The Work Requirements Input Form is used to enter and update M&R requirements. Each line contains data about a separate M&R requirement.* Requirements for more than one pavement section can be entered on the same form. Data about a requirement can be entered incrementally. For example, the user may wish to leave out such items as material code, priority, and financed/unfinanced status when first entering a work requirement into the data base. The work requirement can be modified later by using an ADD/CH/DEL code of "C" and entering the missing items in the appropriate fields.

*The same work code **must not** be used to define two separate existing work requirements in the same pavement section. Either the two work requirements should be combined into one, or two different work codes should be used.

Input Instructions. Table 10 provides the input instructions for the Work Requirements Input Form. Figure 13 is an example of a completed Work Requirements Input Form. The first two line entries create new work requirements in the data base, the next two line entries modify work requirements previously entered, the fifth line entry deletes a previously entered work requirement, and the last line entry deletes only the "thickness" value from a previously entered work requirement.

Table 10
Input Instructions for Work Requirements Input Form

Field	Format	Columns	Special Instructions
ADD/CH/DEL!	alphanumeric	3	Enter "A" when a job is being created. Enter "C" when more data about a job are being added or when data previously entered are being changed. Enter "D" to completely delete the job from the data base.
DATE REPORTED	numeric	4-9	Enter date decision was made to create job.
FACILITY NUMBER!	alphanumeric	10-14	None
SECTION NUMBER!	alphanumeric	15-16	None
WORK CODE!	numeric	17-21	Enter the code from Table 11 that best describes the work planned. First two digits indicate type of work to be performed. Third digit indicates where the work is to be performed. Fourth and fifth digits are distress code for the distress to be repaired. Example: For deep patching of roadway surface due to alligator cracking, enter code 02101.
MATERIAL CODE	numeric	22-24	Enter the code that corresponds to the type of material to be used in the repair (see Table 12).
EST WORK QUANTITY	numeric	25-34	Enter the estimated quantity of the work to be performed. Quantities should be in the units of measure shown in Table 11.
THICKNESS	numeric	35-39	Enter the thickness in inches of the repair, if applicable.
LABOR HOURS	numeric	40-43	Enter the estimated man-hours required to complete the job.
LABOR COST	numeric	44-48	Enter the estimated labor cost in whole dollars.
MATERIAL COST	numeric	49-54	Enter the estimated material cost in whole dollars.
EQUIPMENT COST	numeric	55-58	Enter the estimated equipment cost in whole dollars.
EST TOTAL COST	numeric	59-65	Enter the estimated total cost of the job in whole dollars. This field may be left blank if the labor, equipment, and material costs have all been entered.
WORK CLASS	alphanumeric	66	Enter one of the following: M = maintenance R = repair C = new construction

Table 10 (cont'd)

Field	Format	Columns	Special Instructions
PRIORITY	numeric	67-69	Enter a number that represents the priority level of the job.
FINANCED	alphanumeric	70-72	Enter "YES" if the project is financed; "NO" if it is not financed.
MANNER OF ACCOMP	alphanumeric	73	Enter one of the following: H = job to be done in-house C = job to be done by contract
REC FY OF REPAIR	numeric	74-75	Enter the last two digits of the **year** in which it is recommended this job be performed.

Table 11
Work Codes

Columns 17 and 18–Work Type*

01 Crack Filling (linear feet)
02 Deep Patch (square feet)
03 Drainage Correction (linear feet)
04 Grinding (square feet)
05 Grooving (square yards)
06 Joint Filling (linear feet)
07 New Construction (square yards)
08 Overlay (square yards)
09 Pothole Filling (number)
10 Reprocessing Reconstruction (Including Heater Planer) (square yards)
11 Seal Coating (square yards)
12 Shallow Patch, Including Leveling (square feet)
13 Slab Jacking and Undersealing (number of slabs)
14 Slab Replacing (square yards)
15 Spreading of Sand or Aggregate (square yards)
16 Others

Column 19–Where Work is Performed

1 Roadway Surface
2 Shoulder
3 Sidewalk
4 Curb and Gutter
5 Ditch
6 Culverts
7 Manholes/Inlets
8 Simple Bridges
9 Others

Columns 20-21–Distress Type

Asphalt Surfaces

01 Alligator Cracking
02 Bleeding
03 Block Cracking
04 Bumps
05 Corrugation
06 Depression
07 Edge Cracking
08 Longitudinal/Transverse Cracking
09 Patch/Utility Cut
10 Polished Aggregate
11 Pothole
12 Railroad Crossing
13 Slippage Crossing
14 Weathering/Raveling
15 Reflection Cracking
16 Rutting
17 Swell
18 Shoving
19 Overall Deterioration
20 Other

Concrete Surfaces

21 Blow-Up
22 Linear Cracking (longitudinal, transverse and diagonal)
23 Durability Cracking
24 Faulting
25 Joint Seal Damage
26 Patch/Utility Cut
27 Polished Aggregate
28 Popouts
29 Pumping
30 Railroad Crossing
31 Scaling
32 Divided Slab
33 Joint Spalling
34 Corner Spalling
35 Corner Break
36 Small Patch (less than 5 sq ft [0.46 m^2])
37 Shrinkage Cracking
38 Depression
39 Shoulder Drop
40 Overall Deterioration
41 Other

*Units of measure for each work type are shown in parentheses.

Table 12
Material Codes

100 Surface Materials*

110 Portland Cement Concrete
- 111 plain
- 112 reinforced concrete pavements (RCP)
- 113 continuously reinforced concrete pavement (CRCP)
- 114 prestressed
- 115 fibrous

120 Asphalt Concrete

130 Road Mix Bituminous Surface

140 Sand-Asphalt
- 141 plant mix
- 142 road mix

150 Surface Treatments
- 151 single-layer aggregate seal
- 152 double-layer aggregate seal
- 153 three- or more layer aggregate seal
- 154 sand seal
- 155 slurry seal
- 156 fog seal
- 157 prime coat
- 158 tack coat
- 159 dust layering

160 Preformed Joint Fillers
- 161 bituminous fiber
- 162 cork
- 163 self-expanding cork
- 164 self-expanding rubber
- 165 sponge rubber
- 166 closed cell plastic

170 Joint and Crack Sealers
- 171 hot-poured
- 172 cold-poured

180 Others

200 Treated or Stabilized Materials

210 Cement Treated
- 211 gravel and crushed stone
- 212 sand
- 213 silt and clay

220 Lime-Flyash Treated
- 221 gravel and crushed stone
- 222 sand
- 223 slag

230 Lime-Treated Fine-Grained Soil

240 Asphalt-Treated Plant Mix
- 241 crushed stone
- 242 gravel
- 243 sand

250 Asphalt-Treated Road Mix
- 251 crushed stone
- 252 gravel
- 253 sand

280 Others

300 Untreated Materials

310 Crushed Stone
- 311 well-graded
- 312 poorly graded (one-sized)
- 313 high fines content

320 Gravel
- 321 well-graded
- 322 poorly graded
- 323 high fines content

330 Sand
- 331 well-graded
- 332 poorly graded
- 333 high fines content

340 Fine-Grained Soils
- 341 sandy silt
- 342 silt
- 343 clayey silt
- 344 sandy clay
- 345 silty clay
- 346 clay
- 347 organic silt
- 348 organic clay

380 Other

*For unpaved roads, refer to treated or untreated materials list for identification purpurposes.

WORK REQUIREMENTS

WORK CLASSIFICATION

M = MAINTENANCE
R = REPAIR
C = NEW CONSTRUCTION

MANNER OF ACCOMPLISHMENT

H = IN HOUSE
C = BY CONTRACT

FORM ID	ADD/CH/DEL !	(N) DATE REPORTED MO	DA	YR	(N) FACILITY NUMBER !	SECTION NUMBER !	(N) WORK CODE ! WORK TYPE	WHERE	DISTRESS TYPE	(N) MATERIAL CODE	(N) EST WORK QUANTITY	(N) THICKNESS	(N) LABOR HOURS	LABOR COST	(N) MATERIAL COST	(N) EQUIP COST	(N) EST TOTAL COST	WORK CLASS	(N) PRIORITY	FINANCED	MANNER OF ACCOMP	(N) REC. FY OF REPAIR
1 2	3	4 5	6 7	8 9	10 11 12 13 14	15 16	17 18	19	20 21	22 23 24	25 26 27 28 29 30 31 32 33 34	35 36 37 38 39	40 41 42 43	44 45 46 47 48	49 50 51 52 53 54	55 56 57 58	59 60 61 62 63 64 65	66	67 68 69	70 71 72	73	74 75
13	A	Ø3	12	77	Ø3256	Ø1	Ø9	1	11		5.ØØ	.	2	12	2	1	15	M	1		H	78
13	A	Ø3	15	77	ØØ261	Ø3	Ø8	1	19	12Ø	2505.ØØ	1.5Ø					4259				C	79
13											.	.										
13	C				ØØØ15	Ø1	11	1	14		.	.								YES		
13	C				ØØ112	Ø2	12	1	Ø1		.	.					325					
13											.	.										
13	C				Ø11Ø8	Ø4	Ø6	1	25		.	* .										
13											.	.										
13											.	.										
13											.	.										
13											.	.										
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13											.	.										
1 2	3	4 5	6 7	8 9	10 11 12 13 14	15 16	17 18	19	20 21	22 23 24	25 26 27 28 29 30 31 32 33 34	35 36 37 38 39	40 41 42 43	44 45 46 47 48	49 50 51 52 53 54	55 56 57 58	59 60 61 62 63 64 65	66	67 68 69	70 71 72	73	74 75

Figure 13. Completed Work Requirements Input Form.

Work Completed Input Form

Use. This form is used to record the work that has been performed on pavement sections. It is used in three different ways:

1. If the job specified by the facility number, section number, and work code was previously entered into the data base via the Work Requirements Input Form and the material code, work classification, manner of accomplishment, and estimated costs and quantities were all correct, all that needs to be entered on the Work Completed Input Form is the information in the critical fields. This will mark the previously defined work requirement "completed" in the data base.

2. If the job was previously entered as a work requirement but the material code, work classification, manner of accomplishment, quantities, or costs of the completed job are different, then the critical fields should be filled in along with the corrected values for those fields that need to be changed. This marks the work requirement as completed and assures that all data stored concerning the completed job are accurate.

3. If the job has never been entered as a work requirement,* as much data as possible should be filled in on the Work Completed Input Form. This will create a record of the completed job in the data base. In all cases, a separate line of the Work Completed Input Form should be used to enter data about each job completed. Jobs for more than one pavement section can be entered on the same form.

Input Instructions. Table 13 presents the input instructions for the Work Completed Input Form and Figure 14 shows an example of data being entered on the form.

*If the work code of the job completed differs from the work code of the previously entered work requirement, the job can be considered to have never been entered as a work requirement. As much data as possible should be entered on the Work Completed Input Form. The work requirement will have to be deleted with an ADD/CH/DEL code "D" on the Work Requirements Form.

Table 13
Input Instructions for Work Completed Input Form

Field	Format	Columns	Special Instructions
ADD/CH/DEL!	alphanumeric	3	None
DATE COMPLETED!	numeric	4-9	None
FACILITY NUMBER!	alphanumeric	10-14	None
SECTION NUMBER!	alphanumeric	15-16	None
WORK CODE!	numeric	17-21	Enter the code from Table 11 that best describes the work performed. First two digits indicate type of work. Third digit indicates where work was performed. Fourth and fifth digits are the distress code for the distress that was repaired.
MATERIAL CODE	numeric	22-24	Enter code for type of material used in repair (see Table 12).
WORK QUANTITY	numeric	25-34	Enter the quantity of the work performed.
THICKNESS	numeric	35-39	Enter the thickness in inches.
LABOR HOURS	numeric	40-43	Enter the estimated man-hours required to complete the job.
LABOR COST	numeric	44-48	Enter the estimated labor cost in whole dollars.
MATERIAL COST	numeric	49-54	Enter the estimated material cost in whole dollars.
EQUIPMENT COST	numeric	55-58	Enter the estimated equipment cost in whole dollars.
TOTAL COST	numeric	59-65	Enter the actual cost of the job in whole dollars.
WORK CLASS	alphanumeric	66	Enter one of the following: M = maintenance R = repair C = new construction
MANNER OF ACCOMP	alphanumeric	67	Enter one of the following: H = work was done in-house C = work was done by contract

WORK COMPLETED

WORK CLASSIFICATION

M = MAINTENANCE
R = REPAIR
C = NEW CONSTRUCTION

MANNER OF ACCOMPLISHMENT

H = IN HOUSE
C = BY CONTRACT

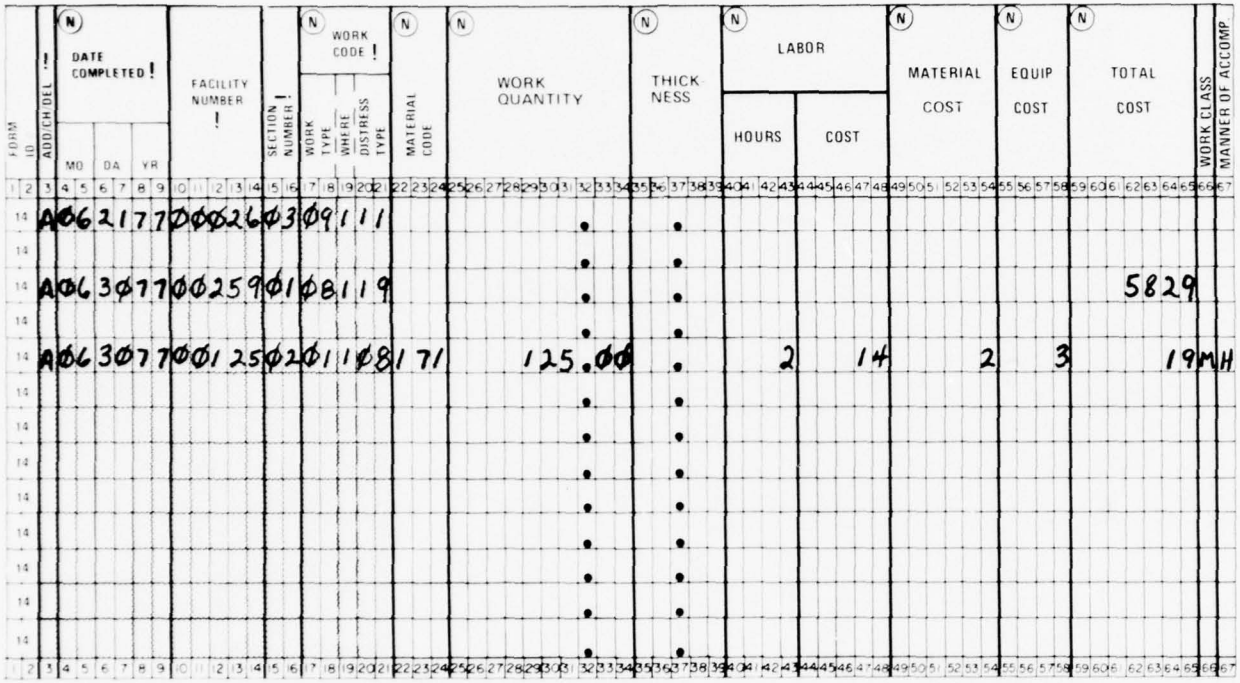


Figure 14. Example data entry on Work Completed Input Form.

Work Comments Input Form

Use. This form is used with the Work Requirements or Work Completed Input Forms to record any additional comments about future or completed jobs. The comment may be up to two lines long.

Input Instructions. Table 14 gives input instructions for the Work Comments Input Form. Figure 15 shows an example of a work comment entry that corresponds to a work requirement.

Table 14
Input Instructions for Work Comments Input Form

Field	Format	Columns	Special Instructions
ADD/CH/DEL!	alphanumeric	3	Enter "D" to delete comment from data base. Enter "C" to replace previously entered comment with another comment.
FACILITY NUMBER!	alphanumeric	4-8	None
SECTION NUMBER!	alphanumeric	9-10	None
WORK CODE!	numeric	11-15	Enter work code from Work Requirements or Work Completed Input Forms.
DATE COMPLETED!	numeric	16-21	Enter date work completed if comment corresponds to job on Work Completed Input Form. Leave blank if comment corresponds to job on Work Requirements Input Form.
WORK COMMENTS	alphanumeric	23-62	Enter comment. Comment may be two lines long if necessary.

WORK COMMENTS

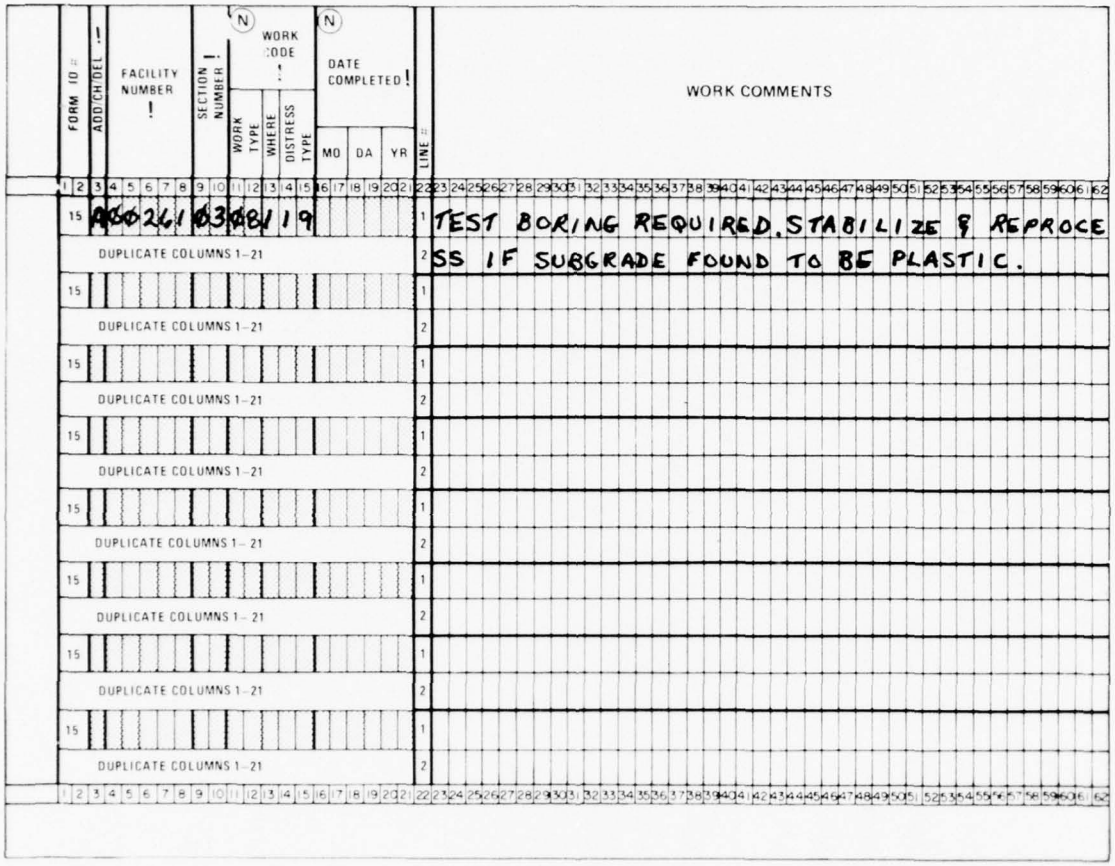


Figure 15. Example work comment entry corresponding to a work requirement.

Pavement Structure Input Form

Use. The Pavement Structure Input Form is used to record the structural layering of a pavement section. A separate form is used for each pavement section. Each line of the form represents a layer in the pavement structure. Data about the layers of a pavement section need not all be entered at one time.

Input Instructions. Table 15 provides the input instructions for the Pavement Structure Input Form, and Figure 16 shows an example completed form.

Table 15
Input Instructions for the Pavement Structure Input Form

Field	Format	Columns	Special Instructions
FACILITY NUMBER!	alphanumeric	3-7	Enter on first line only.
SECTION NUMBER!	alphanumeric	8-9	Enter on first line only.
ADD/CH/DEL!	alphanumeric	10	Enter "C" only if data about a particular layer are to be changed. To add layers not previously recorded, enter "A." **Overlay and surface treatment repairs that are entered on Work Completed Input Forms will automatically be added to the pavement structure portion of the data base and need not be manually entered on the Pavement Structure Input Form.** The "OVERLAY" and "SURFACE TREATMENT" lines on the Pavement Structure Input Form are used to record overlays and surface treatments that were completed in past years (before the data base was created) if this information is available.
LAYER CATEGORY!	alphanumeric	11-20	Preprinted. Cross out those layer categories that do not apply to the structure of the pavement section. Also, cross out those layer categories for which data are not being entered at this time. Data should only be entered on lines of the form that do not have the layer category crossed out. Other lines should be left blank.
DATE CONST!	numeric	21-24	Enter approximate date layer was constructed. This field is critical for overlays and surface treatments only.
LAYER MATERIAL CODE	numeric	25-27	Enter the code that corresponds to the type of material in the layer (see Table 12).
LAYER THICKNESS	numeric	28-31	Enter thickness of layer in inches and tenths of inches. Decimal point is preprinted. Column 31 must be filled in.
TYPE OF COATING	alphanumeric	32-41	If the layer has a coating, enter one of the following: SEAL TACK PRIME WATERPROOF Other (specify) If the layer does not have a coating, leave blank.
COMMENTS	alphanumeric	42-80	Enter any additional comments about the layer.

PAVEMENT STRUCTURE

TYPE OF COATING
SEAL
TACK
PRIME
WATERPROOF
OTHER (SPECIFY)

FORM ID	FACILITY NUMBER	SECTION NUMBER	ADD/CH/DEL	LAYER CATEGORY	DATE CONST MO	DATE CONST YR	LAYER MATERIAL CODE	LAYER THICKNESS (IN)	TYPE OF COATING	COMMENTS
6	ØØ368Ø3			SUBSTRUCT				•		
				SUBSTRUCT				•		
				SUBSTRUCT				•		
KEYPUNCH OPERATOR PUNCH ONLY THOSE LINES WITH HANDWRITTEN DATA. DUPLICATE COLUMNS 1-9 ON ALL CARDS.			A	OVERLAY	Ø8	74	12Ø	1.5		
				SUBSTRUCT				•		
				SUBSTRUCT				•		
			A	SURFACE	Ø6	59	12Ø	2.Ø		
				LEVELING				•		
			A	BASE	Ø6	59	31Ø	6.Ø	PRIME	
			A	SUBBASE	Ø6	59	322	12.Ø		
				SUBJECT				•		
				COMP SUBGR				•		
			A	SUBGRADE	Ø6	59	343	5.Ø		

Figure 16. Completed Pavement Structure Input Form.

Layer Material Properties Input Form

Use. This form is used to record the results of any tests performed on the structural layers of a pavement section. A separate line is used to record the results of each test. The results of tests performed on more than one pavement section can be entered on the same form.

Input Instructions. Table 16 presents the input instructions for the Layer Material Properties Input Form. Figure 17 shows how layer material property test results are entered into the data base.

Table 16
Input Instructions for Layer Material Properties Input Form

Field	Format	Columns	Special Instructions
ADD/CH/DEL!	alphanumeric	3	None
FACILITY NUMBER!	alphanumeric	4-8	None
SECTION NUMBER!	alphanumeric	9-10	None
TEST DATE!	numeric	11-16	Enter date test was performed.
LAYER CATEGORY!	alphanumeric	17-26	Enter layer category to which test was performed. Choose from the following: SURF TREAT OVERLAY SURFACE LEVELING BASE SUBBASE SELECT COMP SUBGR SUBGRADE Other (specify)
TEST TYPE!	alphanumeric	27-57	Enter the name of the test performed.
TEST VALUE	numeric	58-67	Enter the test value.
TEST UNIT	alphanumeric	68-80	Enter the type of unit that corresponds to the test value, if applicable (e.g., lb/cu ft)

LAYER MATERIAL PROPERTIES

LAYER CATEGORIES

OVERLAY	SUBBASE
SURF TREAT	SELECT
SURFACE	COMP SUBGR
LEVELING	SUBGRADE
BASE	

FORM ID	ADD/CH/DEL	FACILITY NUMBER	SECTION NUMBER	TEST DATE MO	TEST DATE DA	TEST DATE YR	LAYER CATEGORY	TEST TYPE	TEST VALUE	TEST UNIT
17	A	000038	01	03	12	77	SUBGRADE	SUBGRADE MODULUS	350.0000	PCI
17	A	012580	01	03	18	77	BASE	CBR	80.0000	PERCENT
17									•	
17									•	
17									•	
17									•	
17									•	
17									•	
17									•	
17									•	
17									•	
17									•	

Figure 17. Entry of layer material property data into data base.

Traffic Survey Input Form

Use. The Traffic Survey Input Form is used to record the results of a traffic survey performed on a pavement section. A separate form is used for each pavement section. A separate line of the form is used for each traffic type counted in the traffic survey.

Input Instructions. The input instructions for the top and bottom portions of the Traffic Survey Input Form are given in Tables 17 and 18, respectively. Figure 18 shows a completed form.

Table 17
Input Instructions for Top of Traffic Survey Input Form

Field	Format	Columns	Special Instructions
ADD/CH/DEL!	alphanumeric	3	None
FACILITY NUMBER!	alphanumeric	4-8	Enter on first line only.
SECTION NUMBER!	alphanumeric	9-10	Enter on first line only.
SURVEY DATE!	numeric	11-16	Enter on first line only.
TRAFFIC TYPE!	alphanumeric	17-56	Enter one of the following: A = Passenger, panel, and pickups. B = Two-axle trucks and buses, half- or full-track vehicles less than 20 kips (89 kN), forklift trucks less than 5 kips (22 kN). C = Trucks with three or more axles, half- or full-track vehicles 20 to 40 kips (89 to 178 kN), forklift trucks 5 to 10 kips (22 to 44 kN). D = Tracked vehicles 40 to 60 kips (178 to 267 kN), forklift trucks (44 to 67 kN). E = 60 to 90-kip (267 to 400 kN) tracked vehicles, 15 to 20-kip (67 to 89 kN) forklifts. F = 90 to 120-kip (400 to 534 kN) tracked vehicles, 20 to 35-kip (89 to 156 kN) forklifts. If none of these apply (as in the case of airfields), specify the traffic type.
TRAFFIC VOLUME	numeric	57-63	Enter the volume of the traffic type entered in the previous field.
TRAFFIC VOLUME UNITS	alphanumeric	64-78	Enter the type of units that correspond to the volume (e.g., oper/lane/day).
VOLUME INDEX	numeric	79-80	For roads, an alternative to entering traffic volume and traffic volume units is the volume index found in Table 19. If volume index is entered, traffic volume and traffic volume units should be left blank. If traffic volume and traffic volume units are entered, volume index should be left blank.

Table 18
Input Instructions for Bottom of Traffic Survey Input Form

Field	Format	Columns	Special Instructions
ADD/CH/DEL!	alphanumeric	3	None
TRAFFIC SURVEY COMMENTS	alphanumeric	18-57	Enter any additional comments about the traffic survey. Comments may be two lines long.

Table 19
Traffic Volume Index for Roads

TRAFFIC TYPE						
A	B	C	D	E	F	
ANNUAL AVERAGE OPERATION PER LANE PER DAY						
None	None	None	None	None	None	0
less than 100	less than 10	less than 10	less than 1	less than 1	less than 1	1
100-499	10-49	10-49	1-4	1-4	1-4	2
500-999	50-199	50-199	5-9	5-9	4-9	3
1000-1999	200-499	200-499	10-19	10-19	10-19	4
2000-3999	500-999	500-999	20-49	19-49	20-39	5
4000-5999	1000-1499	1000-1499	50-99	50-99	40-59	6
6000-7999	1500-1999	1500-1999	100-199	100-149	60-79	7
8000-9999	2000-2499	2000-2499	200-399	150-199	80-99	8
more than 10,000	more than 2500	more than 2500	more than 400	more than 200	more than 100	9

VOLUME INDEX

A = Passenger, panel, and pickups.

B = Two-axle trucks and buses; half- or full-track vehicles less than 20 kips (89 kN); forklift trucks less than 5 kips (22 kN).

C = Trucks with three or more axles; half- or full-track vehicles 20 to 40 kips (89 to 178 kN); forklift trucks 5 to 10 kips (22 to 44 kN).

D = Tracked vehicles 40 to 60 kips (178 to 267 kN); forklift trucks 10 to 15 kips (44 to 67 kN).

E = 60 to 90-kip (267 to 400 kN) tracked vehicles; 15 to 20-kip (67 to 89 kN) forklifts.

F = 90 to 120-kip (400 to 534 kN) tracked vehicles; 20 to 35-kip (89 to 156 kN) forklifts.

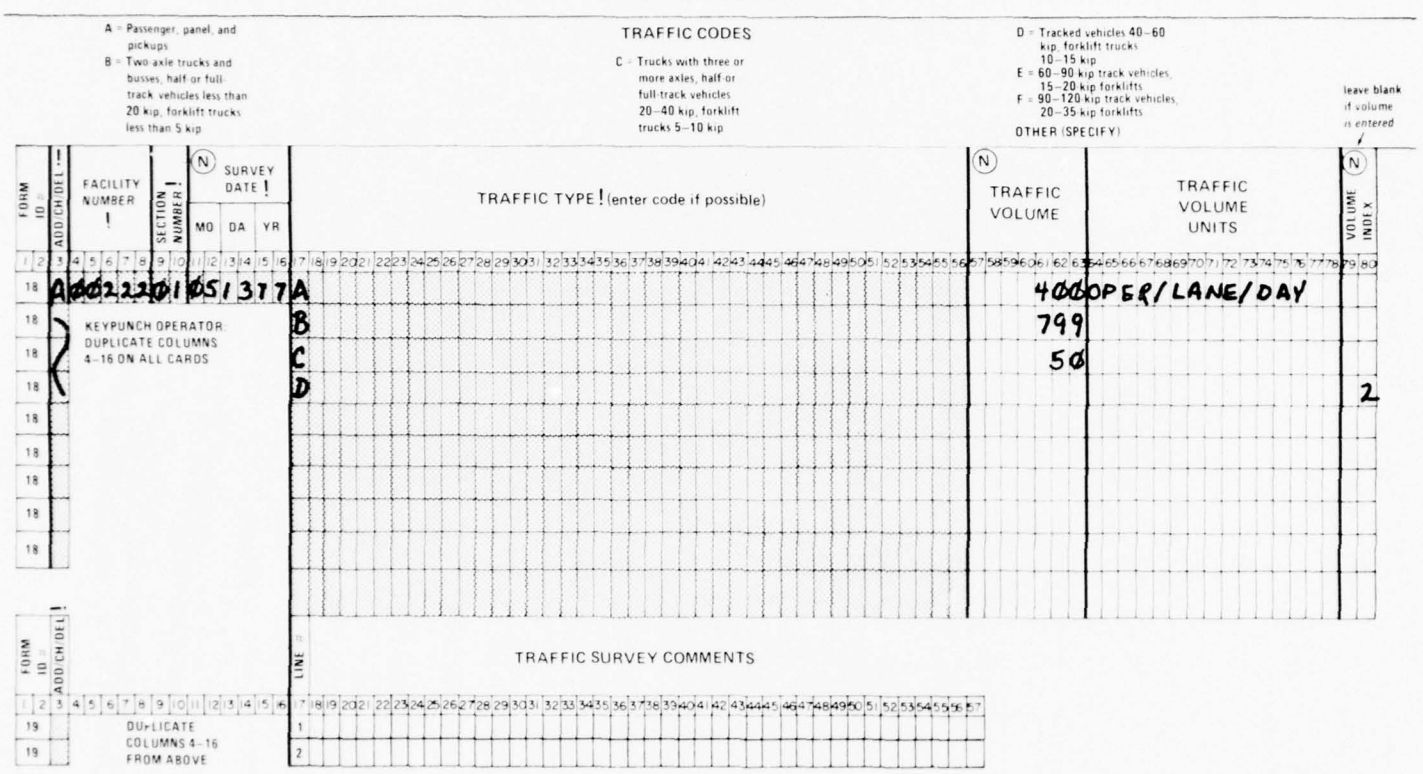


Figure 18. Completed Traffic Survey Input Form.

5 PAVER REPORTS

Available Reports

At present, six reports can be generated from the information stored in the PAVER data base. The reports are designed to assist the pavement engineer in making pavement maintenance management decisions. Report generation is performed on-line via a computer terminal, a feature which provides for timely decision making. The following is a list of these reports along with a brief description of each.

1. INV provides an inventory of pavement sections in the pavement network. Basic information such as location, surface type, facility use, pavement rank, and pavement area is reported for each pavement section.

2. INSPECT provides the user with results of condition surveys performed on pavement sections, including quantities and severities of distress and overall condition ratings.

3. WORKREQ provides a list of maintenance and repair requirements as determined by the pavement engineer based on the most recent inspection results.

4. WORKHIS provides a list of past maintenance and repair performed on the pavement network.

5. RECORD provides comprehensive information on each pavement section, including section identification and dimensions; shoulder, drainage, and secondary structure identification; work history; pavement structure; layer material properties; results of traffic surveys; and proposed future work for the section.

6. ECON provides an economic analysis of various maintenance and repair alternatives.

Each of the reports can be generated for the entire pavement network or can be limited to the information the user desires by using selected report options. Many options are applicable to each report, with several of these options being common to all the reports. To avoid repetition, the common report options are presented first, followed by the individual report formats and the additional options available for each. Detailed instructions for generating the reports are presented in the next chapter.

Common Report Options

Table 20 lists the report options that can be used in generating any of the reports except RECORD and ECON. For each category selected from the left side of the table, the user can choose from the list on the right side. For example, if the pavement engineer is interested in obtaining an inventory of parking facilities only, he/she can generate the report INV where the "FACILITY USE" equals "PARKING." To obtain the M&R requirements for a section "7" of Green Street, the user can generate the report WORKREQ where the "FACILITY NAME" equals "GREEN ST" and "SECTION NUMBER" equals "7."

Table 20
Common Report Options

Category	Choices
FACILITY NUMBER	Any valid facility number stored in the data base
FACILITY NAME	Any valid facility name stored in the data base
SECTION NUMBER	Any valid section number stored in the data base
FACILITY USE	ROADWAY PARKING RUNWAY TAXIWAY APRON HELIPAD or any other valid facility use stored in the data base
FACILITY AREA	Number of square yards (seven digits or less)
SECTION AREA	Number of square yards (seven digits or less)
SECTION WIDTH	Number of linear feet (four digits or less)
FAMILY HOUSE	YES NO
PAVEMENT RANK	PRIMARY SECONDARY TERTIARY OTHER
SURFACE TYPE	AC (asphalt concrete) PCC (portland cement concrete) ST (surface treatment) GR (gravel) X (other)
SLAB WIDTH	Number of linear feet (three digits or less)
SLAB LENGTH	Number of linear feet (three digits or less)
ZONE*	Any valid zone identifier stored in the data base.

*See page 70.

Report Formats and Additional Options

INV Report (Figure 19)

Format. The report is divided into family and non-family housing pavements. The pavement sections are listed alphabetically by facility name.

Additional Options. None.

```
REPORT DATE:  10/15/82

                                INVENTORY
                        NON-FAMILY HOUSING PAVEMENTS

                                          SURF     FACILITY       PAVEMENT          AREA
                                          TYPE       USE            RANK            (SY)
----------
I0003 BUTNER ST
      SECTION  1                          PCC      ROADWAY        SECONDARY         1248
      FROM: S EDGE OF JACKSON
      TO:   CENTER OF PATTON

      SECTION  2                          PCC      ROADWAY        TERTIARY           480
      FROM: CENTER OF PATTON
      TO:   N EDGE OF PERSHING

                                                              TOTAL FACILITY AREA    1728

----------
P0006 GOLF CLUB PARKING
      SECTION  1                          PCC      PARKING                           344
      FROM: S OF ARCTIC AVE
      TO:   N OF BLDG 663

                                                              TOTAL FACILITY AREA     344

----------
R0009 NW-SE RUNWAY
      SECTION  1                          AC       RUNWAY         PRIMARY          35567
      FROM: TAXIWAY 12
      TO:   NE-SW APRON

      SECTION  2                          AC       RUNWAY         PRIMARY           4820
      FROM: NE-SW APRON
      TO:   N OF E-W RUNWAY

      SECTION  3                          AC       RUNWAY         PRIMARY           5254
      FROM: S OF E-W RUNWAY
      TO:   N OF TAXIWAY 2

                                                              TOTAL FACILITY AREA   45641

                TOTAL AREA OF SELECTED NON-FAMILY HOUSING PAVEMENTS                 47,713
```

Figure 19. Example INV report.

INSPECT Report (Figure 20)

Format. The report is ordered alphabetically by facility name and section number. The inspections for each section are ordered from earliest inspection date to latest inspection date. For each inspection date, the distress types found are listed alphabetically.

Additional Options. Table 21 lists the additional options for the INSPECT report.

Table 21
Additional Options for INSPECT Report

Category	Choices	
INSPECTION DATE	Date inspection performed; of the form MM/DD/YYYY (e.g., 05/01/1976)	
RIDING QUALITY SAFETY DRAINAGE CONDITION SHOULDER CONDITION OVERALL CONDITION	C1 C2 C3	
PCI (pavement condition index)*	100 or less	
DISTRESS CODE or DISTRESS TYPE	**Code**	**Type**
	01	ALLIGATOR CR
	02	BLEEDING
	03	BLOCK CR
	04	BUMPS
	05	CORRUGATION
	06	DEPRESSION
	07	EDGE CR
	08	LONG/TRANS CR
	09	PATCH/UTIL CUT
	10	POLISHED AGG
	11	POTHOLE
	12	RR CROSSING
	13	SLIPPAGE CR
	14	WEATHER/RAVEL
	15	REFLECTION CR
	16	RUTTING
	17	SWELL
	18	SHOVING
	19	OVERALL DETER
	20	OTHER
	Code	**Type**
	21	BLOW UP
	22	LINEAR CR
	23	DURABILITY CR
	24	FAULTING
	25	JOINT SEAL DAM
	26	PATCH/UTIL CUT
	27	POLISHED AGG
	28	POPOUTS
	29	PUMPING
	30	RR CROSSING
	31	SCALING
	32	DIVIDED SLAB
	33	JOINT SPALLING
	34	CORNER SPALLING
	35	CORNER BREAK
	36	SMALL PATCH
	37	SHRINKAGE CR
	38	DEPRESSION
	39	SHOULDER DROP
	40	OVERALL DETER
	41	OTHER
SEVERITY		HIGH MEDIUM LOW

*The PCI is a numerical rating which is calculated from the quantities and severities of distress found during inspection of the pavement section. Procedures for calculating the PCI are presently being developed and will be incorporated into PAVER in FY78.

REPORT DATE: 05/04/77

PAVEMENT INSPECTION

FACILITY NAME - BUTNER ST
FACILITY NUMBER - I0003
SECTION NUMBER - 1

SLAB LENGTH - 15 LF
SLAB WIDTH - 9 LF
NUMBER OF SLABS - 83

INSPECTION DATE - 08/25/76
CONDITION: RIDING-3 SAFETY-3 DRAINAGE-2 SHOULDERS-2 OVERALL-3

DISTRESS TYPE	SEVERITY	QUANTITY
BLOW UP	HIGH	1 SLABS
DURABILITY CR	LOW	20 SLABS
JOINT FILL DAM	LOW	83 SLABS
LINEAR CR	MEDIUM	7 SLABS
POPOUTS	LOW	20 SLABS

FACILITY NAME - PERSHING AVE
FACILITY NUMBER - I0001
SECTION NUMBER - 1

SECTION LENGTH - 6158 LF
SECTION WIDTH - 31 LF
SECTION AREA - 21211 SY

INSPECTION DATE - 08/25/76
CONDITION: RIDING-2 SAFETY-1 DRAINAGE-1 SHOULDERS-1 OVERALL-2

DISTRESS TYPE	SEVERITY	QUANTITY
ALLIGATOR CR	MEDIUM	397 SF
BLOCK CR	HIGH	66 SF
DEPRESS/RUTTING	HIGH	25 SF
DEPRESS/RUTTING	MEDIUM	301 SF
LONG/TRANS CR	LOW	397 LF
LONG/TRANS CR	MEDIUM	946 LF

Figure 20. Example INSPECT report.

WORKREQ Report (Figure 21)

Format. A separate report is produced for family and nonfamily housing pavements. The jobs are arranged alphabetically by work proposed and distress to be repaired. Within each work/distress category, the jobs are ordered by priority.

Additional Options. Table 22 lists the additional options.

Table 22
Additional Options for WORKREQ Report

Category	Choices
WORK CODE	See Table 11
WORK DESCRIPTION	CRACK FILLING DEEP PATCH DRAINAGE CORRECT GRINDING GROOVING JOINT FILLING NEW CONST OVERLAY POTHOLE FILLING REPROCESSING SEAL COATING SHALLOW PATCH SLAB JACKING SLAB REPLACING SPREAD SAND/AGG OTHER
DISTRESS	**Asphalt Pavements** ALLIGATOR CR BLEEDING BLOCK CR BUMPS CORRUGATION DEPRESSION EDGE CR LONG/TRANS CR PATCH/UTIL CUT POLISHED AGG POTHOLE RR CROSSING SLIPPAGE CR WEATHER/RAVEL REFLECTION CR RUTTING SWELL SHOVING OVERALL DETER OTHER **Concrete Pavements** BLOW UP LINEAR CR DURABILITY CR FAULTING JOINT SEAL DAM PATCH/UTIL CUT POLISHED AGG POPOUTS PUMPING RR CROSSING SCALING DIVIDED SLAB JOINT SPALLING CORNER SPALLING CORNER BREAK SMALL PATCH SHRINKAGE CR DEPRESSION SHOULDER DROP OVERALL DETER OTHER
WORK CLASSIFICATION	M (maintenance) R (repair) C (new construction)
PRIORITY	Three digits or less
DATE REPORTED	Of the form MM/DD/YYYY (e.g., 05/01/1976)
RECOMMENDED FY OF REPAIR	Two-digit number (e.g., 77)
MANNER OF ACCOMPLISHMENT	H (IN HOUSE) C (BY CONTRACT)
FINANCED	YES NO
THICKNESS	Decimal number; no more than two digits before the decimal point and no more than two digits after the decimal point (e.g., 2.00)
TOTAL COST	Whole dollar amount; seven digits or less (e.g., 1000)

REPORT DATE-03/23/77

WORK REQUIREMENTS
(NON-FAMILY HOUSING PAVEMENTS
WORK TO BE DONE IN HOUSE

WORK PROPOSED- 01103 CRACK FILLING - LONG TRANS CR

FACILITY IDENTIFICATION	SEC NO	LABOR HOURS	LABOR COST$	MAT'L COST$	EQUIP COST$	WORK QUAN LF	TOTAL COST$	PRIOR -ITY	REC FY	FIN-ANCED
FACILITY #I0001 PERSHING AVE	1	5	41	5	7	350.00	53	4	77	YES
FACILITY #T0003 TAXIWAY 2	1	1	3	1	1	25.00	5	10	78	NO
TOTAL		6	44	6	8	375.00	58			

WORK PROPOSED- 09111 POTHOLE FILLING - POTHOLE

FACILITY IDENTIFICATION	SEC NO	LABOR HOURS	LABOR COST$	MAT'L COST$	EQUIP COST$	WORK QUAN NUM	TOTAL COST$	PRIOR -ITY	REC FY	FIN-ANCED
FACILITY #I0001 PERSHING AVE	1	3	5	1	1	2.00	7	3	77	YES
	2	5	12	2	1	5.00	15	3	77	YES
FACILITY #T0003 TAXIWAY 2	1	4	7	1	1	3.00	9	6	77	YES
TOTAL		12	24	4	3	10.00	31			

WORK PROPOSED- 12123 SHALLOW PATCH - DURABILITY CR

FACILITY IDENTIFICATION	SEC NO	LABOR HOURS	LABOR COST$	MAT'L COST$	EQUIP COST$	WORK QUAN SF	TOTAL COST$	PRIOR -ITY	REC FY	FIN-ANCED
FACILITY #F0006 GOLF CLUB PARK I	1	100	540	75	135	1500.00	750	8	78	YES
TOTAL		100	540	75	135	1500.00	750			

GRAND TOTAL $839
(NON-FAMILY HOUSING, IN HOUSE)

Figure 21. Example WORKREQ report.

WORKHIS Report (Figure 22)

Format. The report is divided into family and nonfamily housing pavements. The pavement sections are listed alphabetically by facility name. The work accomplished for each pavement section is ordered by date completed.

Additional Options. Table 23 lists the additional options.

Table 23
Additional Options for WORKHIS Report

Category	Choices
WORK CODE	See Table 11
WORK DESCRIPTION	CRACK FILLING DEEP PATCH DRAINAGE CORRECT GRINDING GROOVING JOINT FILLING NEW CONST OVERLAY POTHOLE FILLING REPROCESSING SEAL COATING SHALLOW PATCH SLAB JACKING SLAB REPLACING SPREAD SAND/AGG OTHER
DISTRESS	**Asphalt Pavements** ALLIGATOR CR BLEEDING BLOCK CR BUMPS CORRUGATION DEPRESSION EDGE CR LONG/TRANS CR PATCH/UTIL CUT POLISHED AGG POTHOLE RR CROSSING SLIPPAGE CR WEATHER/RAVEL REFLECTION CR RUTTING SWELL SHOVING OVERALL DETER OTHER **Concrete Pavements** BLOW UP LINEAR CR
	DURABILITY CR FAULTING JOINT SEAL DAM PATH/UTIL CUT POLISHED AGG POPOUTS PUMPING RR CROSSING SCALING DIVIDED SLAB JOINT SPALLING CORNER SPALLING CORNER BREAK SMALL PATCH SHRINKAGE CR DEPRESSION SHOULDER DROP OVERALL DETER OTHER
MATERIAL CODE	See Table 12
WORK CLASSIFICATION	M (maintenance) R (repair) C (new construction)
MANNER OF ACCOMPLISHMENT	IN HOUSE BY CONTRACT
DATE COMPLETED	Of the form MM/DD/YYYY (e.g., 03/06/1974)
THICKNESS	Number of inches; decimal number with no more than 2 digits before the decimal point and no more than two digits after the decimal point (e.g., 2.5)
TOTAL COST	Whole dollar amount; seven digits or less (e.g., 125)

REPORT DATE: 11/15/76

WORK HISTORY
NON-FAMILY HOUSING PAVEMENTS

SECTION IDENTIFICATION	WORK DESCRIPTION	MANNER ACCOMP	DATE COMPL	IN-PLACE UNIT COST	TOTAL COST
APRON A FAC #A0007 SEC 1					
	OVERLAY 2.00 IN	BY CONTRACT	07/71	1.54/SY	68254
BUTNER ST FAC #I0003 SEC 1					
	SHALLOW PATCH	IN HOUSE	12/63	0.25/SF	7
NW-SE RUNWAY FAC #R0009 SEC 1					
	SHALLOW PATCH	IN HOUSE	06/74	0.43/SF	450
PERSHING AVE FAC #I0001 SEC 1					
	OVERLAY 2.00 IN	BY CONTRACT	03/72	1.60/SY	4766
	CRACK FILLING	IN HOUSE	03/75	0.13/LF	50
	CRACK FILLING	IN HOUSE	05/76	0.14/LF	63
PERSHING AVE FAC #I0001 SEC 2					
	SEAL COAT	BY CONTRACT	06/63	0.20/SY	647
	DEEP PATCH 4.00 IN	BY CONTRACT	06/65	0.50/SF	45
	POTHOLE FILLING	IN HOUSE	07/73	2.40/NMBR	90
TAXIWAY 2 FAC #T0008 SEC 1					
	CRACK FILLING	IN HOUSE	05/71	0.11/LF	30
	POTHOLE FILLING	BY CONTRACT	03/74	2.55/NMBR	60

Figure 22. Example WORKHIS Report.

RECORD Report

Format. RECORD is divided into nine parts or "record cards," as shown below:

1. ID—section identification and dimensions
2. SHOULDER—shoulder information
3. DRAINAGE—drainage information
4. SECOND—secondary structures
5. WORK—work history
6. STRUC—pavement structure
7. TEST—layer material property tests
8. TRAFFIC—traffic record
9. REQUIRE—future maintenance and repair requirements.

The RECORD report can be generated in two general formats:

Format 1. Information contained in the nine record cards, **for only one pavement section**, is printed as shown in Figure 23.

Format 2. Information contained in only one record card, for as many pavement sections as desired, is printed as shown in Figure 24.

Additional Options. The common report options do not apply to format 1. Options must be selected from those listed in Table 24. For format 2, options may be chosen from the common report options and/or from the additional options listed in Table 25 for the selected record card.

Table 24
Options for RECORD Report—Format 1

Category	Choices
FACILITY NUMBER	Any valid facility number stored in the data base
FACILITY NAME	Any valid facility name stored in the data base
SECTION NUMBER	One- or two-digit number

Table 25
Additional Options for RECORD Report—Format 2

1. Additional Options for Record Card ID—none.

2. Additional Options for Record Card SHOULDER:

Category	Choices
SHOULDER CODE	S0 (no shoulder) S1 (paved, wide enough for parking) S2 (paved, too narrow for parking) S3 (unpaved, wide enough for parking) S4 (unpaved, too narrow for parking)

3. Additional Options for Record Card DRAINAGE:

Category	Choices	
	Code	Description
DRAINAGE CODE or DRAINAGE DESCRIPTION	D01	DITCH (FILL) 0-1 FT DEEP
	D02	DITCH (FILL) 1-2 FT DEEP
	D03	DITCH (FILL) 2-3 FT DEEP
	D04	DITCH (FILL) 3-4 FT DEEP
	D05	DITCH (FILL) OVER 4 FT DEEP
	D06	DITCH (CUT) 0-1 FT DEEP
	D07	DITCH (CUT) 1-2 FT DEEP
	D08	DITCH (CUT) 2-3 FT DEEP
	D09	DITCH (CUT) 3-4 FT DEEP
	D10	DITCH (CUT) OVER 4 FT DEEP
	D11	C&G, INLET IN CURB
	D12	C&G, INLET IN GUTTER
	D13	C&G, INLET IN C&G
	D14	C&G, OTHER
	SUB	DAYLIGHT
	SUB	SUBDRAIN
	SUB	Any other valid drainage description stored in the data base

4. Additional Options for Record Card SECOND:

Category	Choices
TYPE OF STRUCTURE	Any valid structure type stored in the data base

5. Additional Options for record Card WORK:

Category	Choices
WORK CODE	See Table 11
WORK DESCRIPTION	CRACK FILLING DEEP PATCH DRAINAGE CORRECT GRINDING GROOVING JOINT FILLING NEW CONST OVERLAY POTHOLE FILLING REPROCESSING

Table 25 (cont'd)

Category	Choices
	SEAL COATING
	SHALLOW PATCH
	SLAB JACKING
	SLAB REPLACING
	SPREAD SAND/AGG
	OTHER
DISTRESS	**Asphalt Pavements**
	ALLIGATOR CR
	BLEEDING
	BLOCK CR
	BUMPS
	CORRUGATION
	DEPRESSION
	EDGE CR
	LONG/TRANS CR
	PATCH/UTIL CUT
	POLISHED AGG
	POTHOLE
	RR CROSSING
	SLIPPAGE CR
	WEATHER/RAVEL
	REFLECTION CR
	RUTTING
	SWELL
	SHOVING
	OVERALL DETER
	OTHER
	Concrete Pavements
	BLOW UP
	LINEAR CR
	DURABILITY CR
	FAULTING
	JOINT SEAL DAM
	PATCH/UTIL CUT
	POLISHED AGG
	POPOUTS
	PUMPING
	RR CROSSING
	SCALING
	DIVIDED SLAB
	JOINT SPALLING
	CORNER SPALLING
	CORNER BREAK
	SMALL PATCH
	SHRINKAGE CR
	DEPRESSION
	SHOULDER DROP
	OVERALL DETER
	OTHER
MATERIAL CODE	*See Table 12*
WORK CLASSIFICATION	M *(maintenance)*
	R (repair)
	C (new construction)

Table 25 (cont'd)

MANNER OF ACCOMPLISHMENT	IN-HOUSE BY CONTRACT
DATE COMPLETED	Of the form MM/DD/YYYY (e.g., 03/06/1974)
THICKNESS	Number of inches; decimal number with no more than two digits before the decimal point and no more than two digits after the decimal point (e.g., 2.0)
TOTAL COST	Whole dollar amount; seven digits or less (e.g., 21265)

6. Additional options for Record Card STRUC:

Category	*Choices*
DATE CONSTRUCTED	Of the form MM/DD/YYYY (e.g., 07/01/1976)
LAYER CATEGORY	SURF TREAT OVERLAY SURFACE LEVELING BASE SUBBASE SELECT COMP SUBGR SUBGRADE
LAYER MATERIAL CODE	See Table 12
LAYER THICKNESS	Number of inches; decimal number with no more than two digits before the decimal point and no more than one digit after the decimal point (e.g., 5.5)
TYPE OF COATING	PRIME SEAL TACK WATERPROOF

7. Additional options for Record Card TEST:

Category	*Choices*
TEST DATE	Of the form MM/DD/YYYY (e.g., 07/01/1976)
TEST TYPE	Any valid name for a type of test stored in the date base
TEST VALUE	Decimal number with no more than five digits before the decimal point and no more than four digits after the decimal point (e.g., 2.531)

Table 25 (cont'd)

8. Additional Options for Record Card TRAFFIC:

Category	Choices
TRAFFIC SURVEY DATE	Of the form MM/DD/YYYY (e.g., 07/01/1976)
TRAFFIC TYPE	A (Passenger, panel, pickup) B (two-axle trucks, buses, tracked vehicles LT 20 kips [89 kN], forklifts LT 5 kips [22 kN]) C (trucks with more than two axles, tracked vehicles 20 to 40 kips [89 to 178 kN], forklifts 5 to 10 kips [22 to 44 kN]) D (tracked vehicles 40 to 60 kips [168 to 267 kN], forklifts 10 to 15 kips [44 to 67 kN]) E (tracked vehicles 60 to 90 kips [267 to 400 kN], forklifts 15 to 20 kips [89 to 156 kN]) F (tracked vehicles 90-120 kips, forklifts 20-35 kips) Any other valid traffic types stored in the data base.

9. Additional Options for Record Card REQUIRE:

Category	Choices
WORK CODE	See Table 11
WORK DESCRIPTION	CRACK FILLING DEEP PATCH DRAINAGE CORRECT GRINDING GROOVING JOINT FILLING NEW CONST OVERLAY POTHOLE FILLING REPROCESSING SEAL COATING SHALLOW PATCH SLAB JACKING SLAB REPLACING SPREAD SAND/AGG OTHER
DISTRESS	**Asphalt Pavements** ALLIGATOR CR BLEEDING BLOCK CR BUMPS CORRUGATION DEPRESSION EDGE CR LONG/TRANS CR PATCH/UTIL CUT POLISHED AGG

Table 25 (cont'd)

Category	Choices
	POTHOLE RR CROSSING SLIPPAGE CR WEATHER/RAVEL REFLECTION CR RUTTING SWELL SHOVING OVERALL DETER OTHER **Concrete Pavements** BLOW UP LINEAR CR DURABILITY CR FAULTING JOINT SEAL DAM PATCH/UTIL CUT POLISHED AGG POPOUTS PUMPING RR CROSSING SCALING DIVIDED SLAB JOINT SPALLING CORNER SPALLING CORNER BREAK SMALL PATCH SHRINKAGE CR DEPRESSION SHOULDER DROP OVERALL DETER OTHER
MATERIAL CODE	See Table 12
WORK CLASSIFICATION	M (maintenance) R (repair) C (new construction)
MANNER OF ACCOMPLISHMENT	IN-HOUSE BY CONTRACT
FINANCED	YES NO
PRIORITY	Three digits or less
DATE REPORTED	Of the form MM/DD/YYYY (e.g., 05/01/1976)
RECOMMENDED FY OF REPAIR	two-digit number (e.g., 77)
EST STARTING DATE	Of the form MM/DD/YYYY (e.g., 05/01/1976)
THICKNESS	Number of inches; decimal number with no more than two digits before the decimal point and no more than two digits after the decimal point (e.g., 1.50)
TOTAL COST	Whole dollar amount; seven digits or less (e.g., 1525)

SECTION IDENTIFICATION

FAC#:	I0001	AREA:	2118 SY
FAC NAME:	PERSHING AVE	LENGTH:	6158 LF
SEC#:	1	WIDTH:	31 LF
FROM:	E EDGE OF WILSON	FACILITY USE:	ROADWAY
TO:	CENTER OF HAGWOOD	PAVEMENT RANK:	PRIMARY
SURFACE:	AC	FAMILY HOUSING:	NO

SHOULDERS
PERSHING AVE
SECTION 1

SHOULDER DESCRIPTION	SHOULDER LOCATION	LENGTH(LF)
NO SHOULDER	SOUTH SIDE	302
PAVED-WIDE ENOUGH FOR PARKING	N SIDE-WILSON TO BLDG 658	302
PAVED-TOO NARROW FOR PARKING	N SIDE-BLDG 658 TO HAGOOD	313

DRAINAGE
PERSHING AVE
SECTION 1

TYPE	DRAINAGE DESCRIPTION	DRAINAGE LOCATION	LENGTH(LF)
SUBSURFACE	DAYLIGHT		
SURFACE	C&G, INLET IN CURB	S SIDE, WILSON TO MAPLE	407
SURFACE	C&G, INLET IN C&G	S SIDE, MAPLE TO HAGOOD	208
SURFACE	DITCH(CUT) 3-4 FT DEEP	NORTH SIDE	

Figure 23. Example RECORD report - format 1.

SECONDARY STRUCTURES
PERSHING AVE
SECTION 1

TYPE OF STRUCTURE	STRUCTURE LOCATION
CULVERT	NEAR BLDG 520
♦DI INLET♦PCC HOWL OUTLET	
MANHOLE	350 FT W OF ELM ST

WORK HISTORY
PERSHING AVE
SECTION 1

DATE COMPLETED	WORK DESCRIPTION	THICKNESS (IN)	DISTRESS REPAIRED	QUANTITY	TOTAL COST($)
03/23/72	OVERLAY	2.00	OVERALL DETER	2118.00 SY	4766
03/07/75	CRACK FILLING		LONG/TRANS CR	200.00 LF	50
05/29/76	CRACK FILLING		LONG/TRANS CR	250.00 LF	63

PAVEMENT STRUCTURE
PERSHING AVE
SECTION 1

LAYER CATEGORY	LAYER MATERIAL	THICKNESS (IN)	DATE CONST	TYPE OF COATING
BASE	CRUSHED STONE	6.0	06/52	PRIME
SUBBASE	POORLY GRADED GRAVEL	6.0	06/52	
SUBGRADE	CLAYEY SILT		06/52	
SURFACE	AC	2.0	06/52	
SURF TREAT	SINGLE-LAYER AGG	0.5	07/63	
OVERLAY	AC	2.0	03/72	

Figure 23. (cont'd).

LAYER MATERIAL PROPERTIES
PERSHING AVE
SECTION 1

TEST DATE	LAYER CATEGORY	TEST TYPE	TEST VALUE
05/06/75	BASE	CBR	80.0000 PERCENT
05/06/75	SUBGRADE	SUBGRADE MODULUS	350.0000 PCI

TRAFFIC RECORD
PERSHING AVE
SECTION 1

TRAFFIC TYPE	TRAFFIC VOLUME
SURVEY DATE: 08/70	
PASSENGER,PANEL,PICKUP	2500 OPER/LANE/DAY
2-AXLE TRUCKS-BUSES,TRACKED VEHICLES LT 20 KIP,FORKLIFTS LT 5 KIP	150 OPER/LANE/DAY
MISC	13 OPER/LANE/DAY
SURVEY DATE: 10/75	
PASSENGER,PANEL,PICKUP	4000 OPER/LANE/DAY
2-AXLE TRUCKS-BUSES,TRACKED VEHICLES LT 20 KIP,FORKLIFTS LT 5 KIP	199 OPER/LANE/DAY
TRUCKS WITH MORE THAN 2 AXLES,TRACKED VEHICLES 20-40 KIP,FORKLIFTS 5-10 KIP	50 OPER/LANE/DAY

WORK REQUIRED
PERSHING AVE
SECTION 1

DATE REPORTED	WORK DESCRIPTION	THICKNESS (IN)	WORK QUANTITY	EST COST($)	PRIORITY	EST START DATE
05/10/76	CRACK FILLING		350.00 LF	88	4	08/76
05/15/76	SHALLOW PATCH		35.00 SF	9	3	05/77
05/15/76	POTHOLE FILLING		2.00 NUM	50	1	03/77

Figure 23. (cont'd).

PAVEMENT STRUCTURE
HAGOOD ST
SECTION 1

LAYER CATEGORY	LAYER MATERIAL	THICKNESS (IN)	DATE CONST	TYPE OF COATING
BASE	POORLY GRADED GRAVEL	4.0	04/59	
SURFACE	CRCP	6.0	04/59	
OVERLAY	AC	1.0	07/68	TACK

PAVEMENT STRUCTURE
HAGOOD ST
SECTION 2

LAYER CATEGORY	LAYER MATERIAL	THICKNESS (IN)	DATE CONST	TYPE OF COATING
BASE	POORLY GRADED GRAVEL	4.0	04/59	
SURFACE	CRCP	6.0	04/59	
OVERLAY	AC	1.5	06/75	

PAVEMENT STRUCTURE
HARRISON RD
SECTION 1

LAYER CATEGORY	LAYER MATERIAL	THICKNESS (IN)	DATE CONST	TYPE OF COATING
BASE	CEMENT TREAT GRAVEL	6.0	06/69	PRIME
SUBBASE	CRUSH STONE,HI FINES	6.0	06/69	
SUBGRADE	CLAYEY SILT		06/69	
SURFACE	AC	4.0	06/69	
SURF TREAT	SINGLE-LAYER AGG	0.5	05/72	

PAVEMENT STRUCTURE
NW-SE RUNWAY
SECTION 1

LAYER CATEGORY	LAYER MATERIAL	THICKNESS (IN)	DATE CONST	TYPE OF COATING
BASE	AC TREATED ROAD MIX	6.0	05/73	PRIME
SUBGRADE	SANDY SILT		05/73	
SURFACE	AC	2.0	05/73	SEAL

Figure 24. Example RECORD report—format 2.

ECON Report (Figure 25)

Format. The user is prompted by questions which he/she answers according to the following guidelines:

In response to:

ENTER FACILITY NAME OR NUMBER

Press the RETURN key and then enter the facility name or number.

ENTER SECTION NUMBER enter:

One or two digits for the section number

ENTER INTEREST RATE (PERCENT) enter:

The annual interest rate (may be a decimal number or an integer)

ENTER THE ANALYSIS PERIOD IN YEARS enter:

An interest from 1 to 30 (may be a decimal number or an integer)

ENTER THE FY FOR THE FIRST YEAR OF ANALYSIS

The FY may be entered in any of the following forms:

1976, 76, FY76

ENTER DESCRIPTION OF WORK OR QUIT enter:

1. A description of 50 characters or less, or

2. QUIT

DO YOU WISH TO MAKE ANOTHER ANALYSIS? (YES/NO) enter:

1. "YES" to repeat, or

2. "NO" to end the report.

Additional Options. The common report options do not apply to ECON, and there are no additional options.

6 GENERATION OF PAVER REPORTS

This chapter provides the user with guidelines and instructions for generating PAVER reports using a computer terminal. Report generation commands are discussed first, followed by instructions for getting the computer terminal ready, getting on-line with the PAVER data base, generating desired reports, and unloading the PAVER data base. General typing instructions and guidelines for handling special problems are presented at the end of the chapter.

Report Generation Commands

One of the following report generation commands should be used for each PAVER report the user selects:

1. GENERATE ALL

This command generates the report for all options.

2. GENERATE ALL WHERE (category) EQ (choice)

Categories and choices are listed in the option table for each report (see Chapter 5). For the selected report, a category and a choice for that category should be chosen and substituted in the command. The category and choice must be spelled exactly as they are spelled in the option table. The EQ stands for "equals." In place of EQ, any of the following may be substituted:

NE (not equal to)

LT (less than; alphabetically before)

LE (less than or equal to)

GT (greater than; alphabetically after)

GE (greater than or equal to).

Examples:

GENERATE ALL WHERE SURFACE TYPE EQ AC

GENERATE ALL WHERE WORK DESCRIPTION EQ CRACK FILLING

GENERATE ALL WHERE FACILITY USE NE ROADWAY

GENERATE ALL WHERE EST STARTING DATE LT 10/01/1977

GENERATE ALL WHERE PCI LE 50

```
-ECON
 ENTER FACILITY NAME OR NUMBER
? ELM ST
 ENTER SECTION NUMBER
? 3
 ENTER INTEREST RATE (PERCENT)
? 6
 ENTER THE ANALYSIS PERIOD IN YEARS
? 5
 ENTER THE FY FOR THE FIRST YEAR OF ANALYSIS
? 77
 ALTERNATIVE A
 ENTER DESCRIPTION OF WORK OR QUIT
? LOCALIZED REPAIR EACH YEAR
 COST FOR YEAR  1 (FY77)
? 1470
 COST FOR YEAR  2 (FY78)
? 150
 COST FOR YEAR  3 (FY79)
? 300
 COST FOR YEAR  4 (FY80)
? 450
 COST FOR YEAR  5 (FY81)
? 1000
 ALTERNATIVE B
 ENTER DESCRIPTION OF WORK OR QUIT
? OVERLAY 1.5 INCH
 COST FOR YEAR  1 (FY77)
? 6726
 COST FOR YEAR  2 (FY78)
? 0
 COST FOR YEAR  3 (FY79)
? 0
 COST FOR YEAR  4 (FY80)
5?
 COST FOR YEAR  5 (FY81)
? 75
 ALTERNATIVE C
 ENTER DESCRIPTION OF WORK OR QUIT
? REPROCESS AND AC OVERLAY 1 INCH
 COST FOR YEAR  1 (FY77)
? 7886
 COST FOR YEAR  2 (FY78)
? 0
 COST FOR YEAR  3 (FY79)
? 0
 COST FOR YEAR  4 (FY80)
? 25
 COST FOR YEAR  5 (FY81)
? 35
```

Figure 25. Example ECON report.

```
 ALTERNATIVE D
 ENTER DESCRIPTION OF WORK OR QUIT
? AC OVERLAY 1 INCH --- YEAR 3
 COST FOR YEAR  1 (FY77)
? 1470
 COST FOR YEAR  2 (FY78)
? 150
 COST FOR YEAR  3 (FY79)
? 6726
 COST FOR YEAR  4 (FY80)
? 0
 COST FOR YEAR  5 (FY81)
? 0
 ALTERNATIVE E
 ENTER DESCRIPTION OF WORK OR QUIT
? QUIT
 REPORT DATE -  76/11/16.
                        COMPARISON OF M&R ALTERNATIVES
                                 ELM ST
                                 SECTION  3


 ANALYSIS PERIOD -  5 YEARS                              INTEREST RATE   6.00 PERCENT
 ALTERNATIVE            DESCRIPTION                        TOTAL PRESENT COST
    A        LOCALIZED REPAIR EACH YEAR                              3048.
    B        OVERLAY 1.5 INCH                                        6827.
    D        AC OVERLAY 1 INCH --- YEAR 3                            7598.
    C        REPROCESS AND AC OVERLAY 1 INCH                         7935.



                        DETAILED COMPARISON OF M&R ALTERNATIVES
          ◆     ALT A     ◆     ALT B     ◆     ALT C     ◆     ALT D     ◆
          ◆               ◆               ◆               ◆               ◆
 YEAR     ◆  COST   PRES  ◆  COST   PRES  ◆  COST   PRES  ◆  COST   PRES  ◆
          ◆               ◆               ◆               ◆               ◆
  1  FY77◆  1470   1470  ◆  6726   6726  ◆  7886   7886  ◆  1470   1470  ◆
  2  FY78◆   150    141  ◆     0      0  ◆     0      0  ◆   150    141  ◆
  3  FY79◆   300    266  ◆     0      0  ◆     0      0  ◆  6726   5986  ◆
  4  FY80◆   450    377  ◆    50     41  ◆    25     20  ◆     0      0  ◆
  5  FY81◆  1000    792  ◆    75     59  ◆    35     27  ◆     0      0  ◆
          ◆               ◆               ◆               ◆               ◆
 TOTAL    ◆        3048  ◆        6827  ◆        7934  ◆        7597  ◆


 DO YOU WISH TO MAKE ANOTHER ANALYSIS? (YES/NO)
? NO
$FL,20000.
```

Figure 25. (cont'd).

GENERATE ALL WHERE RIDING QUALITY GT C1 (i.e., C2 or C3)

GENERATE ALL WHERE DATE COMPLETED GE 01/01/1971

GENERATE ALL WHERE PRIORITY LE 3

GENERATE ALL WHERE FACILITY NAME LT PERSHING AVE (Generates report for those facilities alphabetically before Pershing Ave.)

3. GENERATE ALL WHERE (category) SPANS (choice 1) * (choice 2)

This command restricts the report to only those values that fall numerically or alphabetically between choice 1 and choice 2 (including choice 1 and choice 2). Example:

GENERATE ALL WHERE DATE COMPLETED SPANS 03/01/1977*03/31/1977

(Report will be generated for those jobs that were completed in March of 1977.)

4. GENERATE ALL WHERE (where clause) AND (where clause) AND (where clause) AND . . . .

A "where clause" is any phrase that follows the word "WHERE" in commands 2 and 3. Command 4 is used to combine various where clauses in order to print only the specific information desired from the data base. "OR" may be substituted for "AND" in this command. When a command contains both OR's and AND's, the AND's will be processed first. It is often helpful to insert parentheses in commands that contain both OR's and AND's to make the meaning clear. Examples:

GENERATE ALL WHERE SURFACE TYPE EQ PCC AND FACILITY USE EQ ROADWAY

GENERATE ALL WHERE INSPECTION DATE GE 01/01/1976 AND PAVEMENT RANK EQ PRIMARY AND PCI LE 60

GENERATE ALL WHERE FACILITY USE EQ TAXIWAY OR FACILITY USE EQ ROADWAY

GENERATE ALL WHERE INSPECTION DATE GE 01/01/1976 AND (DISTRESS TYPE EQ BLOCK CR OR DISTRESS TYPE EQ ALLIGATOR CR) (Report is generated for all pavement sections that have either alligator cracking or block cracking, or both, as determined from a pavement inspection that was performed 1 January 1976 or later*.)

GENERATE ALL WHERE WORK DESCRIPTION EQ CRACK FILLING AND DATE COMPLETED SPANS 08/01/1977*08/31/1977

GENERATE ALL WHERE MANNER OF ACCOMPLISHMENT EQ IN HOUSE AND RECOMMENDED FY OF REPAIR EQ 78 AND PRIORITY LE 5

GENERATE ALL WHERE WORK CLASSIFICATION EQ R AND DATE COMPLETED GE 01/01/1975

GENERATE ALL WHERE (PAVEMENT RANK EQ PRIMARY OR PAVEMENT RANK EQ SECONDARY) AND SAFETY NE C1

5a. GENERATE (record card name), or

5b. GENERATE (record card name) WHERE (where clause)

These commands may only be used to generate the report RECORD. RECORD is divided into nine parts, each of which has a record card name (see Chapter 5). If generation of all parts of RECORD for one pavement section is desired, command 4 should be used (GENERATE ALL WHERE FACILITY NAME EQ — AND SECTION NUMBER EQ —). If only one part of RECORD is desired for one or more pavement sections, command 5 a or b should be used. "GENERATE (record card name)" prints the selected record card for all pavement sections in the data base. "GENERATE (record card name) WHERE (where clause)" prints the record card for each pavement section that satisfies the WHERE clause. Examples:

GENERATE SHOULDER

GENERATE STRUC WHERE SURFACE TYPE EQ PCC AND PAVEMENT RANK EQ PRIMARY

GENERATE TRAFFIC WHERE SURVEY DATE GE 01/01/1976 AND FACILITY USE EQ RUNWAY

*If the parentheses were not included in this command, the computer would retrieve the pavement sections that either have had block cracking since 01/01/1976 or have had alligator cracking at any time.

GENERATE TEST WHERE TEST TYPE EQ CBR AND TEST DATE GE 01/01/1975

Once the user is familiar with the options for the reports and knows how to form the generate command, he/she is ready to actually generate the reports by following the procedures presented in the following sections of this chapter. The commands presented are summarized in Figure 26.

Getting the Computer Terminal Ready

1. Set the full/half duplex switch to half duplex.

2. Set the even/odd parity switch to even parity.

3. Set the transmission rate switch to 30 CPS (high).

4. Turn on the terminal.

Logging In

1. Dial the telephone number that is provided and wait for a continuous, high-pitched tone.

2. Connect the telephone receiver to the terminal, making sure the telephone cord is on the correct side.

3. When the "on line" light goes on, press the RETURN key. The system will respond similar to the following:

```
NSRDC 6700 INTERCOM V4.5
DATE  03/10/77
TIME  16.02.33.
```

4. Type:

LOGIN, (user number), (user name)*

and press the RETURN key. The system will respond similar to the following:

```
03/10/77 LOGGED IN AT 16.28.40.
         WITH USER-ID 66
         EQUIP/PORT 63/021
COMMAND-
```

5. Type:

FETCH, PAVER

and press RETURN.

*Individual user numbers and names will be assigned to each user.

The system will respond:

COMMAND-

Loading the Data Base

1. Make the data base available for use by typing the following command and pressing the RETURN key:

BEGIN, LOAD, PAVER

It will take a few minutes for the computer operator to mount the tape containing the data base.

2. After waiting a few minutes, check to see if the data base is available by typing:

BEGIN, CHECK, PAVER

If the data base is ready, the system will reply:

ASSIGNED PAVER

and the user may begin generating reports by issuing the commands described in the next section of this chapter. If, however, the system replies:

DATA BASE DOES NOT EXIST

wait a few minutes and type "BEGIN, CHECK, PAVER" again. Keeping checking until the system replies "ASSIGNED PAVER".

Generating Desired Reports

Generate desired report by typing the following commands. **Always press the RETURN key after typing each command.**

1. To generate ECON, type:

BEGIN, ECON, PAVER

Answer questions as they are displayed on the terminal.

2. To generate reports other than ECON, type the following three commands.

a. Make the desired report available by typing:

BEGIN, REPORT, PAVER, reportname

where "reportname" is one of the report names given in Chapter 5. The system will read the file that contains the report program and respond:

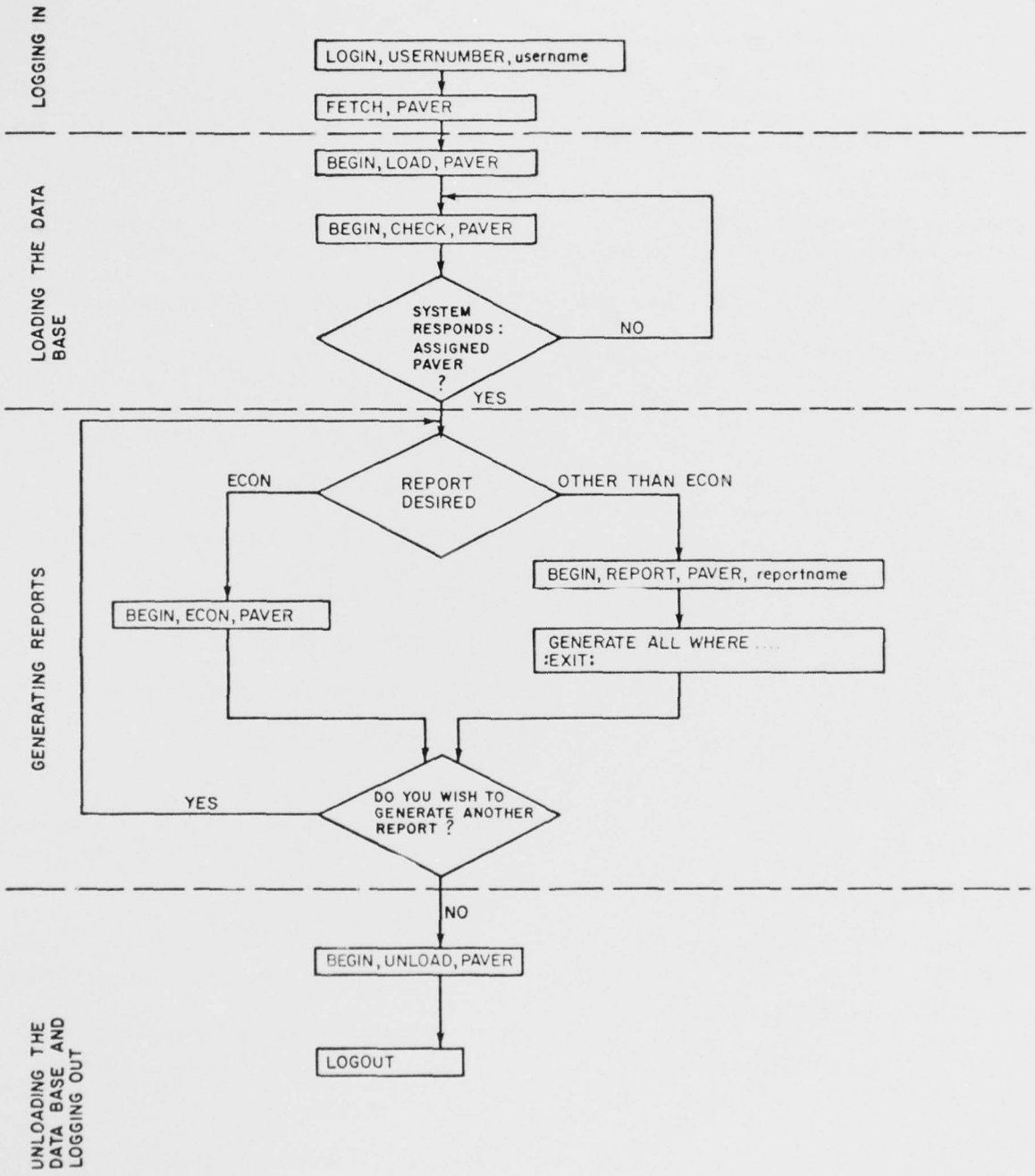


Figure 26. Commands used during a session on the terminal.

TYPE GENERATE COMMAND AND THEN TYPE ":EXIT:"

b. The desired report options may now be chosen with the command: GENERATE ALL WHERE . . . The GENERATE command may be any of those described earlier in this chapter.

c. To print the report, type:

:EXIT:

Do not forget the colons. When the program has printed all the requested information, the system will respond:

END OF REPORT
BEGIN ANOTHER REPORT OR UNLOAD DATA BASE
COMMAND—

3. Repeat steps (1) or (2) for each report desired.

Unloading PAVER Data Base and Logging Out

1. When no more reports are desired, unload the data base by issuing the command:

BEGIN, UNLOAD, PAVER

Do not forget this step. Excessive storage charges will result if the data base is not unloaded. The system will respond:

RELEASED PAVER

followed by some information about the data base that may be ignored.

2. When the word "COMMAND—" appears, end the terminal session by typing:

LOGOUT

The system will respond with elapsed time and cost information.

3. When the terminal stops printing, the telephone receiver may be hung up.

General Typing Instructions

1. No typed command is transmitted to the computer unless the RETURN key is pressed. Always press RETURN after a line is typed.

2. If several typing errors are made in a line, delete the line by holding down the CNTRL key while pressing the X key. Then press the RETURN key and retype the line correctly.

3. If only the last few characters typed needed to be deleted, hold down the CNTRL key and press the H key once for each letter to be deleted. The terminal will backspace over the incorrect characters. Release the CNTRL key and type the correct characters over the incorrect characters. Complete the command and press RETURN.

Guidelines for Handling Special Problems

1. Problem: **telephone connection broken.** The connection with the computer is broken when the "on line" light on the terminal goes out. Hang up the telephone, redial, and repeat the login procedure.* If the disconnection occurred while a report was being generated, start again from the BEGIN, REPORT, PAVER, reportname (or BEGIN, PAVER, ECON) command. Otherwise, begin by repeating the last command issued before the connection was broken.

IMPORTANT: Whenever the telephone connection *is broken, log back in and unload* the data base. Excessive storage charges will result if this is not done.

2. Problem: **terminal printing long report or any other information that is not desired.** Press the BREAK key. The terminal will stop printing. Type "%A" and press RETURN. The system will respond:

COMMAND—

Proceed by running another report, or unload the data base and log out.

3. Problem: ***system does not respond* though "on line" light is on.** The computer may interpret noise on the line as a command being typed in by the user. It will stop printing in order to wait for the entire command. Pressing the RETURN key should cause the terminal to resume printing. If the system does not respond, the computer may be temporarily down or working on someone else's program. Wait a few minutes. If there still is no response, hang up and call again. Be sure to unload the data base and log out when all report generation has been completed.

*The system may respond:
ERR–PAVER ALREADY EXISTS
after the "FETCH, PAVER" command. Ignore this message.

4. Problem: **terminal is not printing what is being typed.** This is due to a bad telephone connection. Hang up and call again.

5. Problem: **"GENERATE" command is too long to be typed on one line.** The terminal will only transmit 80 characters per line to the computer. When nearing the end of the line, finish the word being typed, then press the "RETURN" key. Begin the next line with a space and finish typing the command.*

6. Problem: **the computer responds "END OF REPORT" without having generated a report.** This may be due to typographical errors in the "GENERATE" or ":EXIT:" commands. If so, begin the report again and retype these commands correctly. If there were no typographical errors, the report may not have been generated because there are no data in the data base to fit the conditions of the WHERE clause in the GENERATE command. Begin the report again, but use a different GENERATE command.

7 IMPLEMENTATION

Introduction

The previous chapters have described the structure of the PAVER data base, the input forms for entering data into PAVER, and the currently available reports that can be generated on-line using a computer terminal. The questions remaining are how to establish this system at an installation, how to use the reports, and how to keep the information in the data base current. Figures 27, 28, and 29 summarize the answers to these questions and together show how PAVER can be completely implemented. The three figures are explained in the following sections.

Figure 27—Initiating the PAVER Data Base

Divide Pavement Network Into Facilities and Sections

Before any data can be entered into the PAVER data base, the facilities in the pavement network must be identified with a name and number and divided into sections.

Each street, parking lot, runway, taxiway, etc., in the pavement network is considered to be a separate facility. Pavement facilities without names are assigned names that will make them easily recognizable to the roads and grounds staff. For example, the parking lot for the post exchange (building 102) can be named PX Parking or Parking Lot 102. To facilitate data storage and retrieval, abbreviations should be standardized and punctuation eliminated as much as possible. For example, if there are facilities named "Elm St" and "Taxiway 2," other facilities should be named similarly: "Davis Ave" rather than "Davis Avenue" or "Davis Ave."; "Taxiway 3" rather than "Taxiway-3," "Taxiway #3," or "Taxiway Three."

Facilities can be assigned numbers in accordance with any numbering system devised by the pavement engineer, except that a facility number must be five digits or less and should not be identical to any number used on the installation to identify a nonpavement facility such as a building. Substituting a letter for one or more digits in the facility number is acceptable if it is useful. Installations using the Integrated Facilities System (IFS) should assign IFS facility numbers in a manner that is consistent with PAVER. Appendix A contains guidelines for assigning IFS facility numbers.

A pavement section is defined as a portion of a facility that can be expected to perform uniformly along its length. Pavement sections are the basic units for which data are stored and work planned in the PAVER system. Guidelines for dividing facilities into sections are given in Chapter 2 of CERL Technical Information Pamphlet C-49.

Develop Workmap

Figure 30 is an example of a "workmap" produced by designating the facility names and numbers and section numbers and end-points on a copy of the general roads and railroads map for one installation. The pavement engineer, shop foremen, and any other persons involved with the maintenance and repair of pavements should be provided with a copy of the workmap.

Once the workmap has been developed, as much information as possible should be entered on the Facility Identification and Section Identification Input Forms.

Dividing Workmap Into Zones

The guidelines on the workmap shown in Figure 30 divide the installation into zones. The zones are identified by letters along the vertical axis and numbers along the horizontal axis similar to a roadmap. Zoning

*A line should not be ended in the middle of the name of a "category" (such as WORK DESCRIPTION) or the name of a "choice" (such as CRACK FILLING).

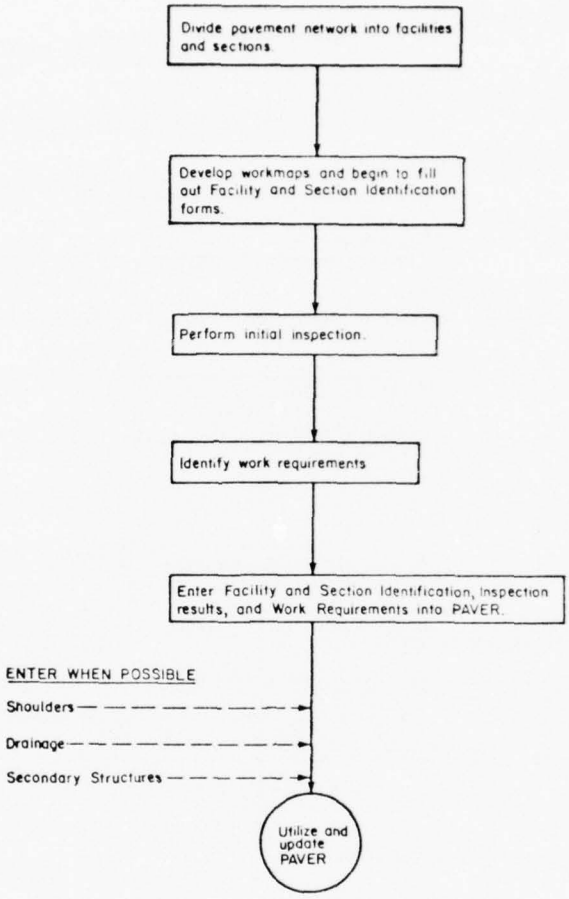


Figure 27. Initiating the PAVER data base.

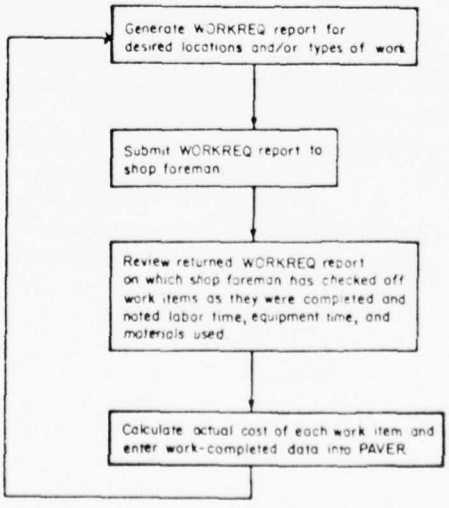


Figure 28. Using PAVER for assigning M&R work.

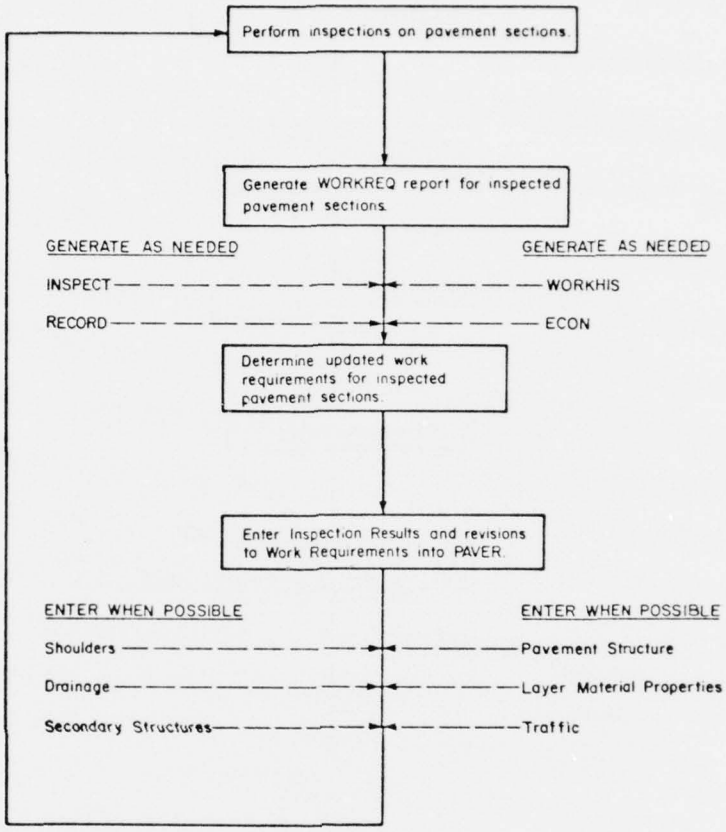


Figure 29. Using PAVER to update work requirements.

enables the pavement engineer to retrieve work requirements from the data base for a selected location within the installation so that M&R can be effectively scheduled. The A1, A2, A3 . . . numbering system indicates the proximity of zones to each other.

Proximity of proposed work will be a factor in a method that will be developed to optimize work planning.

Perform Initial Inspection

The next step is to inspect the entire pavement network. Guidelines for performing inspections are given in Appendix B. Besides collecting section condition and distress data, the inspection team should collect the section dimension information needed to complete the Facility and Section Identification Input Forms. If possible, data on shoulders, drainage, and secondary structures should be entered on the appropriate input forms during the initial inspection.

Identify Work Requirements

All data collected during the initial inspection should be returned to the pavement engineer, who evaluates the information and determines the work requirements for each pavement section according to the guidelines provided in CERL Technical Information Pamphlet C-49.

Enter Data Into Data Base

Using the input forms discussed in Chapter 4, the pavement engineer enters the facility identification, section identification, inspection results, work requirements, and any shoulder, drainage, and secondary structure information into the PAVER data base via the desk terminal. This initiates the PAVER data base

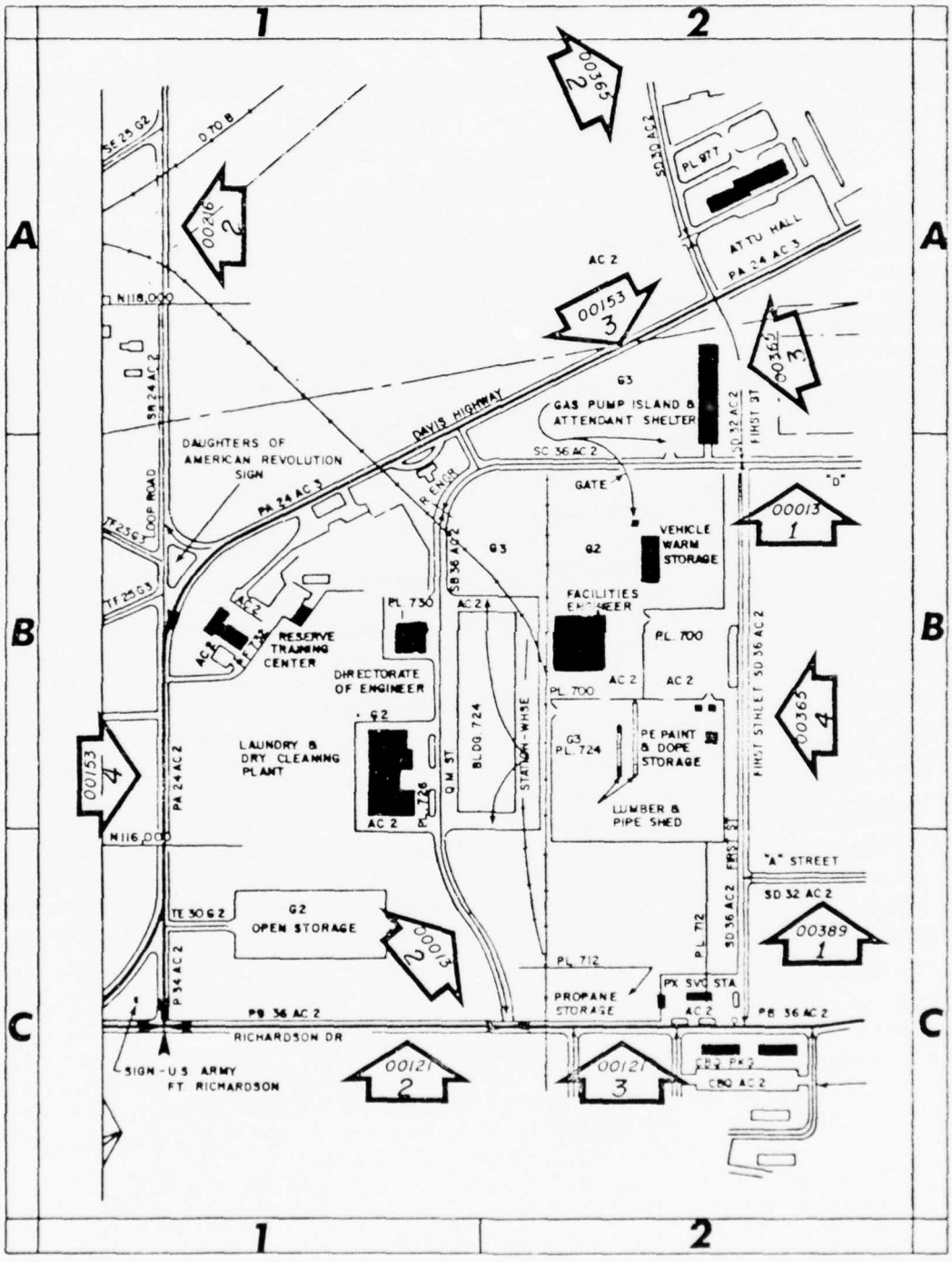


Figure 30. Example "workmap."

for the installation. The data base is now ready to be utilized.

Figure 28—Using PAVER for Assigning M&R Work

When it is time for work to be performed, the pavement engineer can retrieve the work requirements stored in the data base by generating the WORKREQ report on the computer terminal. The WORKREQ report can be generated by priority level, selected types of work, and/or selected locations within the installation, thereby aiding the pavement engineer in effectively scheduling work assignments. The pavement engineer provides a copy of the WORKREQ report containing the chosen work items to the shop foreman. The shop maintenance crew uses the workmap to locate the pavement sections listed on the report. As the crew completes the required repairs, they should be checked off on the WORKREQ report. Any discrepancies between the work requirements and actual work performed should be noted on the WORKREQ report along with the date completed (see Figure 31). The annotated WORKREQ report should be returned to the pavement engineer when all work items have been completed. The date completed and any changes in quantities, materials, or costs should be entered into the data base using the Work Completed Input Form as described in Chapter 4. If the work code entered on the Work Completed Input Form is the same as the work code on the WORKREQ report (the work code appears directly after the words "Work Proposed:"), the computer automatically deletes the completed work items from the WORKREQ report and adds them to the WORKHIS and RECORD reports. If the work code is different, the work requirement is not automatically deleted. The pavement engineer must manually delete the work requirement with an ADD/CH/DEL code of "D" on the Work Requirements Input Form, as described in Chapter 4. As work performed by contract is completed, it is entered in the data base in a similar way.

Figure 29—Using PAVER to Update Work Requirements

To be useful to the pavement engineer, the data in the PAVER data base should reflect the current condition of the pavement network. Periodic inspections should be performed on each pavement section according to the guidelines given in Appendix B. If possible, missing shoulder, drainage, and secondary structure data should be gathered during the inspections. When the pavement engineer receives the inspection results, he/she should generate the WORKREQ report for the inspected pavement sections to see if the work requirements stored in the data base for that section are still valid. Other reports such as RECORD, INSPECT, and WORKHIS can also be generated to assist in making work requirements decisions. If necessary, an economic analysis of various M&R alternatives can be obtained by generating the report ECON. Once the work requirements for the pavement section are determined, the pavement engineer should update the data base by adding, changing, or deleting work requirements and entering all data gathered during the recent inspection. Whenever possible, traffic surveys should be performed and data on the types and volumes of traffic using the pavement should be entered into the data base. Structural layering information can be gathered from "as-built" records or from borings made during repairs and should be included in the data base as soon as possible.

By keeping information in the data base current and complete, the pavement engineer will always have available a valuable tool for planning the maintenance and repair of pavements.

REPORT DATE-03/23/77

WORK REQUIREMENTS
NON-FAMILY HOUSING PAVEMENTS
WORK TO BE DONE IN HOUSE

WORK PROPOSED- 01108 CRACK FILLING - LONG TRANS CR

FACILITY IDENTIFICATION	SEC NO	LABOR HOURS	LABOR COST$	MAT'L COST$	EQUIP COST$	WORK QUAN LF	TOTAL COST$	PRIOR -ITY	REC FY	FIN-ANCED
FACILITY #I0001 PERSHING AVE	1	~~5~~ 7	~~44~~ 49	5	7	350.00	~~55~~ 61	4	77	YES
FACILITY #T0008 TAXIWAY 2	1	1	3	1	1	25.00	5	10	78	NO
TOTAL		6	44	6	8	375.00	58			

WORK PROPOSED- 09111 POTHOLE FILLING - POTHOLE

FACILITY IDENTIFICATION	SEC NO	LABOR HOURS	LABOR COST$	MAT'L COST$	EQUIP COST$	WORK QUAN NUM	TOTAL COST$	PRIOR -ITY	REC FY	FIN-ANCED
FACILITY #I0001 PERSHING AVE	1	3	5	1	1	2.00	7	3	77	YES
	2	5	12	2	1	5.00	15	3	77	YES
FACILITY #T0008 TAXIWAY 2	1	4	~~7~~ 12	~~7~~ 2	1	~~3.00~~ 5.00	9	6	77	YES
TOTAL		12	24	4	3	10.00	31			

WORK PROPOSED- 12123 SHALLOW PATCH - DURABILITY CR

FACILITY IDENTIFICATION	SEC NO	LABOR HOURS	LABOR COST$	MAT'L COST$	EQUIP COST$	WORK QUAN SF	TOTAL COST$	PRIOR -ITY	REC FY	FIN-ANCED
FACILITY #P0006 GOLF CLUB PARK I	1	100	~~540~~ 567	~~75~~ 78	~~135~~ 141	~~1500.00~~ 1575.00	~~750~~ 786	8	78	YES
TOTAL		100	540	75	135	1500.00	750			

GRAND TOTAL 839
(NON-FAMILY HOUSING, IN HOUSE)

Figure 31. Annotated WORKREQ report.

APPENDIX A: GUIDELINES FOR NUMBERING PAVEMENT FACILITIES IN IFS

This appendix presents guidelines designed to provide a facility numbering system for pavement facilities that will be consistent with both IFS and the CERL pavement maintenance management system. The numbering system presented applies to surfaced or unsurfaced roads, parking lots and storage areas, runways, taxiways, aprons, and helicoptor pads. For convenience, all such facilities will be grouped under the term "pavement facilities." Each road, parking lot, runway, etc., should be considered to be a **separate** pavement facility.

The IFS facility number consists of six characters grouped into two fields. Immediately following the facility number of all IFS input forms is a three-character facility suffix. **For pavements, these three characters should remain blank.** The composition of the facility number/suffix is illustrated in Figure A1 and described in the following paragraphs:

1. Type Construction Code Field. IFS requires that *this field contain a letter designating whether the facility* is permanent, semipermanent, or temporary. One of the following letters should always be entered in this field:

P - Permanent (planned life of over 25 years)

S - Semipermanent (planned life of 5 to 25 years)

T - Temporary (planned life of under 5 years).

2. Facility Identifier Field. This field contains five alphabetic or numeric characters that **should be unique** for each pavement facility. Assignation of the facility identifiers is left to the discretion of personnel at each installation. The five-digit facility identifier is the number that will be used to identify pavement facilities in PAVER.

3. Facility Suffix. The purpose of the facility suffix in IFS is to subdivide the facility into smaller units so that more detailed information can be stored about the facility. However, IFS cannot provide for information at the level of detail obtainable in PAVER, even when the suffix is used. Therefore, it is more efficient to subdivide the facilities into sections in PAVER and leave the suffix code blank in IFS. (This means that only one set of Assets Accounting Cards needs to be filled out for an entire facility rather than a set for each section of the facility.) Figure A2 shows an example of a valid pavement facility number/suffix.

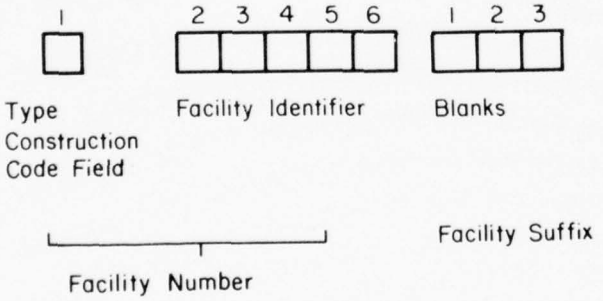


Figure A1. Composition of facility number/suffix.

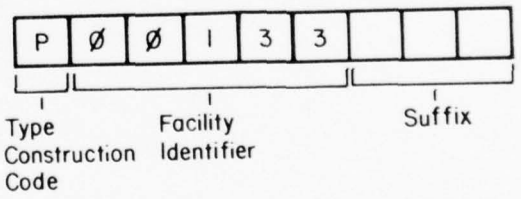


Figure A2. Example facility number/suffix.

APPENDIX B: GUIDELINES FOR PERFORMING PAVEMENT INSPECTIONS ON ROADS

Introduction

Determination of the pavement condition and M&R needs requires measurement of all distress existing on the pavement surface. A thorough pavement inspection must be made to determine the types, severity, and amounts (density) of distress* present. The pavement inspection must be carefully planned and performed according to the guidelines presented in this appendix.

There are two methods of performing pavement inspections. For both methods the pavement section must be divided into subsections called sample units. The first method requires inspection of all sample units in the section (inspection of the entire section); the second method requires inspection of only a portion of the sample units in the section (inspection by sampling). Inspection by sampling is explained in greater detail at the end of this appendix.

In both cases, all the sample units in the section must be assigned sample unit numbers. Instructions for inspecting the individual sample units are presented in the following paragraphs.

Equipment

The equipment needed to perform the inspection includes a measuring wheel (odometer), 6- or 12-in. (152- or 305-mm) ruler, and a 10-ft (3-m) straightedge.

*Photographs and descriptions of each severity level of each distress type for roads and streets are available in CERL Technical Information Pamphlet C-48. This manual should be followed very closely to obtain accurate inspection results. A revision of this manual will be available in the future.

Inspection of Sample Units for Jointed Concrete Pavement Sections

For jointed concrete pavement sections, a sample unit should consist of approximately 20 slabs. Figure B1 shows an example of a pavement section divided into sample units. Each sample unit is inspected individually by walking over each slab of the unit and recording distress(es) on the sample unit inspection sheet (Figure B2).

The sample unit should be sketched on the inspection sheet using the preprinted dots as joint intersections. The distress codes and severities of each distress other than joint seal damage should be recorded on the sketch in the square that corresponds to the slab in which the distress was found. For example, in Figure B2 the notation 22M indicates that medium level linear cracking was found in the first slab.

The total number of slabs having each severity level of each distress type should be summarized in the Distress Summary portion of the inspection sheet. Also, the overall rating for joint seal damage should be recorded by entering L, M, or H on the line preprinted with distress code 25. The distress summary information will later be transferred to the Inspection Results Input Form described in Chapter 4.

Inspection of Sample Units for Asphalt- and Tar-Surfaced Pavement Sections

For flexible pavements, sample units should be approximately 2500 sq ft (230 m^3). Figure B3 shows an example of a pavement section divided into sample units.

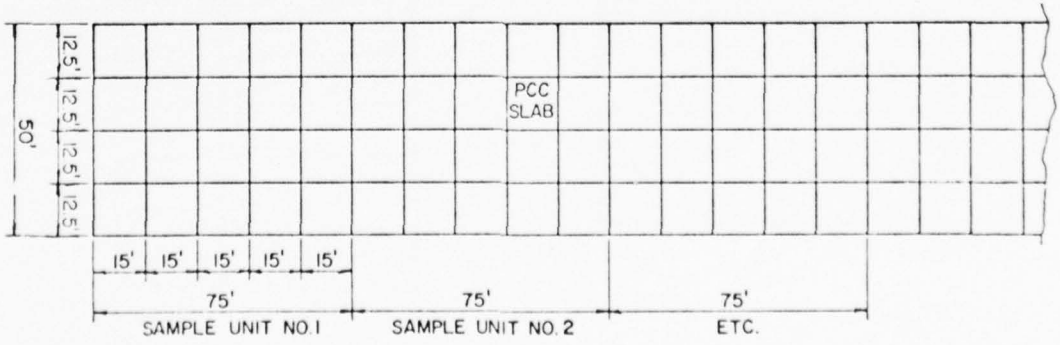


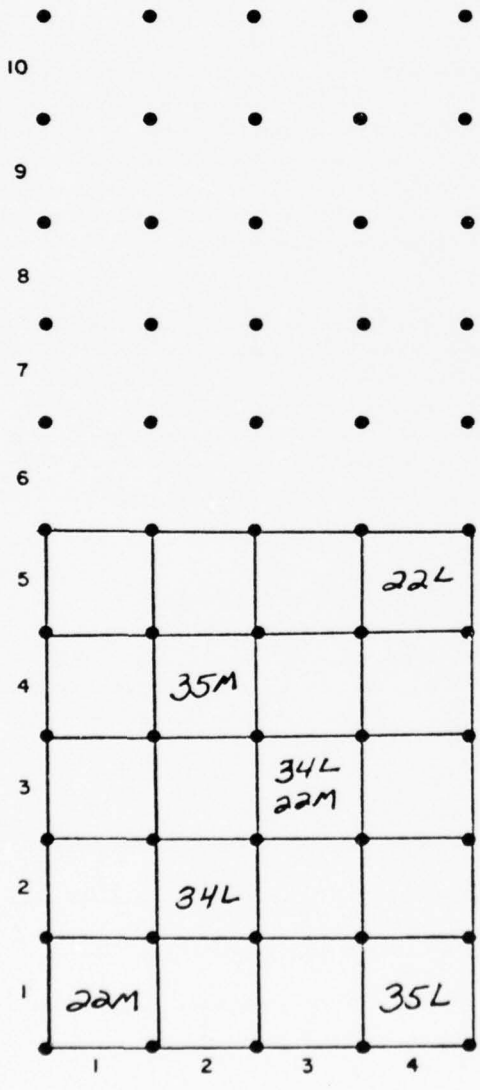
Figure B1. Example division of a pavement section into sample units of 20 slabs.

JOINTED CONCRETE PAVEMENT
SAMPLE UNIT INSPECTION SHEET

FACILITY NAME OR NUMBER SPRINGFIELD SECTION NUMBER 1

SAMPLE UNIT NUMBER 2 RANDOM ☑ ADDITIONAL ☐

NUMBER OF SLABS IN SAMPLE UNIT 20



DISTRESS TYPES AND CODES

21.	BLOW UP	31.	SCALING
22.	LINEAR CR (Long, Trans, and Diag)	32.	DIVIDED SLAB
		33.	JOINT SPALLING
		34.	CORNER SPALLING
23.	DURABILITY CR	35.	CORNER BREAK
24.	FAULTING	36.	SMALL PATCH (Less than 5 Sq Ft.)
25.	JOINT SEAL DAM		
26.	PATCH/UTIL CUT	37.	SHRINKAGE CR
27.	POLISHED AGG	38.	DEPRESSION
28.	POPOUTS	39.	SHOULDER DROP
29.	PUMPING	40.	OVERALL DETER
30.	RR CROSSING	41.	OTHER

DISTRESS SUMMARY

DIST. CODE	SEV.	TOTAL NMBR OF SLABS
25	M	
22	L	1
22	M	2
34	L	2
35	L	1
35	M	1

Figure B2. Jointed concrete pavement sample unit inspection sheet.

Each sample unit is inspected individually by walking over the unit, measuring each distress type and severity, and recording the data on the sample unit inspection sheet (Figure B4). A separate column is used to record the quantities and severities of each distress type found in the sample unit. In the example shown in Figure B4, the first distress encountered was 10 ft (3.0 m) of low level longitudinal cracking so the first column was headed with distress code 8, and 10L was entered in that column. The next distress encountered was a 16 sq ft (1.5 m^2) area of medium level alligator cracking, so the second column was headed with distress code 1 and 16M was entered in that column. The next distress was 5 ft (1.5 m) of low level transverse cracking, so 5L was entered in the column headed by distress code 8, and so on. After the inspection is completed, quantities should be totaled at the bottom of each column. These totals are later entered on the Inspection Results Input Form described in Chapter 4.

Inspection by Sampling

Inspection of every sample unit in a pavement section may require considerable effort, especially if the section is very large. This is particularly true for asphalt- or tar-surfaced pavements containing much distress. Because of the time and effort involved, frequent surveys of an entire section subjected to a heavy traffic volume may be beyond available manpower, funds, and time. Therefore, a sampling plan was developed to allow adequate determination of the pavement conditions and M&R needs by inspecting only a portion of the sample units in a section. Use of the statistical sampling plan described in this section will reduce inspection considerably without significant loss of accuracy. Use of this sampling plan is entirely optional; in fact, inspection of the entire section may be necessary if exact quantities of distress must be known for contractual maintenance work.

Determination of Number of Samples

The minimum number of sample units to be inspected should be determined from Figures B5 and B6 for jointed concrete and asphalt- or tar-surfaced pavements, respectively. The numbers obtained from these figures will insure adequate accuracy in the determination of the pavement section condition.

Selection of Samples

Determination of how to select the sample units is as important as determining the minimum number of samples. Samples must be selected randomly to assure an unbiased result. If the number of sample units in a section exceeds 10, stratifying the section is recommended. Stratifying the section involves dividing it into a number of parts called strata. An equal number of samples units are randomly selected from each stratum, as illustrated in the following example.

Figure B3 shows the section to be inspected; it contains a total of 25 sample units numbered from 1 to 25. The required minimum number of sample units is determined to be 10 (from Figure B6). The section can be divided into 5 strata of 5 sample units each:

Stratum 1—sample units 1 through 5

Stratum 2—sample units 6 through 10

Stratum 3—sample units 11 through 15

Stratum 4—sample units 16 through 20

Stratum 5—sample units 21 through 25.

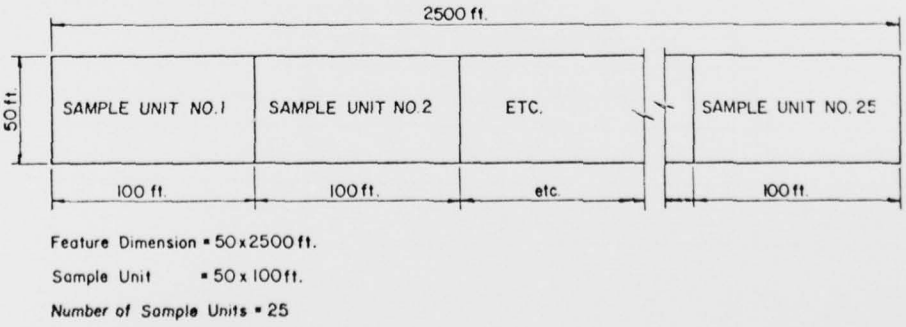


Figure B3. Example division of asphalt- or tar-surfaced pavement section into sample units.

ASPHALT OR TAR SURFACED PAVEMENT
SAMPLE UNIT INSPECTION SHEET

FACILITY NAME OR NUMBER Green St SECTION NUMBER 5

SAMPLE UNIT NUMBER 7 RANDOM ☑ ADDITIONAL ☐

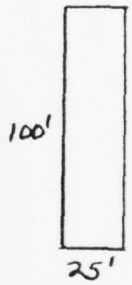
AREA OF SAMPLE 2500 SF

DISTRESS TYPES AND CODES*

1.	ALLIGATOR CR	11.	POTHOLE
2.	BLEEDING	12.	RR CROSSING
3.	BLOCK CR	13.	SLIPPAGE CR
4.	BUMPS	14.	WEATHER / RAVEL
5.	CORRUGATION	15.	REFLECTION CR
6.	DEPRESSION	16.	RUTTING
7.	EDGE CR	17.	SWELL
8.	LONG / TRANS CR	18.	SHOVING
9.	PATCH / UTIL CUT	19.	OVERALL DETER
10.	POLISHED AGG	20.	OTHER

* ALL DISTRESSES ARE MEASURED IN SQ. FT. EXCEPT 7, 8, AND 15, WHICH ARE MEASURED IN LINEAR FT., AND DISTRESS 11, FOR WHICH THE NUMBER OF OCCURRENCES IS RECORDED.

SKETCH:



DISTRESS CODE 8	DISTRESS CODE 1	DISTRESS CODE 16	DISTRESS CODE	DISTRESS CODE	DISTRESS CODE
10L	16 M	50 L			
5L	6 L				
15L					
5M					
10L					
5M					

QUANTITIES & SEVERITIES

TOTALS	L	M	H	L	M	H	L	M	H	L	M	H	L	M	H	L	M	H
	40	10		6	16		50											

Figure B4. Asphalt- or tar-surfaced pavement sample unit inspection sheet.

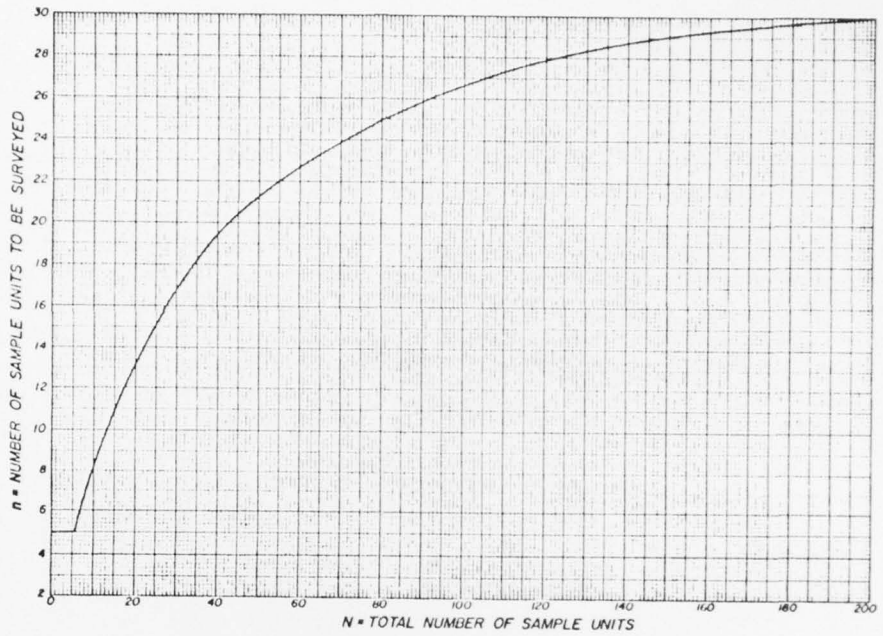


Figure B5. Plot for determining number of sample units required for jointed concrete pavement.

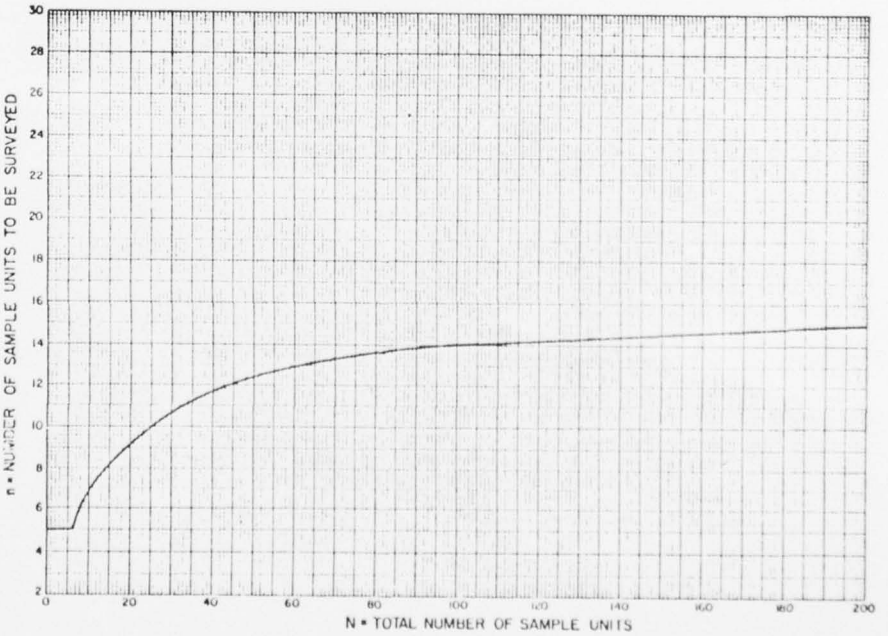


Figure B6. Plot for determining number of sample units required for asphalt- or tar-surfaced pavements.

Two sample units are selected at random from each stratum using a random number table, such as Table B1. Units can be selected for this example by starting with any two digits in the table. The starting point in this example is at columns 5 and 6 of row 10, where the two digit number 17 is located. To select two sample units for Stratum 1, two random numbers between 01 and 05 must be selected. Proceeding down columns 5 and 6 from the starting point, the first two random numbers encountered that fall between 01 and 05 are 03 (row 16) and 01 (row 25); therefore sample units 01 and 03 will be inspected. The process would then be repeated for the other four strata. The numbers selected using this procedure are circled in Table B1 and listed below.

Stratum 1—sample units 01 and 03

Stratum 2—sample units 09 and 10

Stratum 3—sample units 12 and 13

Stratum 4—sample units 16 and 17

Stratum 5—sample units 21 and 23.

Inspecting Additional Samples

The inspection data obtained will be used in PAVER to extrapolate the quantities and densities of each distress over the entire pavement section. The extrapolation process, however, will produce erroneous results for certain distresses which are not typical of the behavior of the entire pavement section. A special procedure should be followed for potholes, blow-ups, railroad crossings, and other distresses that are obviously not uniformly distributed along the pavement section.

If a nontypical distress falls within a random sample, the sample should be identified as additional on the field inspection sheet and another sample should be selected at random to replace it. For example, if a pothole is found in random sample 17, sample 17 should be completely inspected and identified on the field inspection sheet as additional. Another sample should be chosen randomly and included in the inspection.

If a nontypical distress occurs in a sample that was not randomly selected, the sample containing the nontypical distress and all other samples containing the same distress should be inspected and recorded as additional samples.

Section Inspection Sheet

In addition to the sample unit inspection sheets that are filled out for the individual sample units, one Section Inspection Sheet (Figure B7) should be completed for each pavement section inspected. This sheet will contain overall condition ratings and other information that applies to the entire pavement section. The same sheet can be used for both concrete or asphalt pavements.

Table B1
Typical Random Number Table

	00-04	05-09	10-14	15-19	20-24	25-29	30-34	35-39	40-44	45-49
00	54463	22662	65905	70639	79365	67382	29085	69831	47058	08186
01	15389	85205	18850	39226	42249	90669	96325	23248	60933	26927
02	85941	40756	82414	02015	13858	78030	16269	65978	01385	15345
03	61149	69440	11286	88218	58925	03638	52862	62733	33451	77455
04	05219	81619	10651	67079	92511	59888	84502	72095	83463	75577
05	41417	98326	87719	92294	46614	50948	64886	20002	97365	30976
06	28357	94070	20652	35774	16249	75019	21145	05217	47286	76305
07	17783	00015	10806	83091	91530	36466	39981	62481	49177	75779
08	40950	84820	29881	85966	62800	70326	84740	62660	77379	90279
09	82995	64157	66164	41180	10089	41757	78258	96488	88629	37231
10	96754	17676	55659	44105	47361	34833	86679	23930	53249	27083
11	34357	88040	53364	71726	45690	66334	60332	22554	90600	71113
12	06318	37403	49927	57715	50423	67372	63116	48888	21505	80182
13	62111	52820	07243	79931	89292	84767	85693	73947	22278	11551
14	47534	09243	67879	00544	23410	12740	02540	54440	32949	13491
15	98614	75993	84460	62846	59844	14922	48730	73443	48167	34770
16	24856	03648	44898	09351	98795	18644	39765	71058	90368	44104
17	96887	12479	80621	66223	86085	78285	02432	53342	42846	94771
18	90801	21472	42815	77408	37390	76766	52615	32141	30268	18106
19	55165	77312	83666	36028	28420	70219	81369	41943	37466	41067
20	75884	12952	84318	95108	72305	64620	91318	89872	45375	85436
21	16777	37116	58550	42958	21460	43910	01175	87894	81378	10620
22	46230	43877	80207	88877	89380	32992	91380	03164	98656	59337
23	42902	66892	46134	01432	94710	23474	20423	60137	60609	13119
24	81007	00333	39693	28039	10154	95425	39220	19774	31782	49037
25	68089	01122	51111	72373	06902	74373	96199	97017	41273	21546
26	20411	67081	89950	16944	93054	87687	96693	87236	77054	33848
27	58212	13160	06468	15718	82627	76999	05999	58680	96739	63700
28	70577	42866	24969	61210	76046	67699	42054	12696	93758	03283
29	94522	74358	71659	62038	79643	79169	44741	05437	39038	13163
30	42626	86819	85651	88678	17401	03252	99547	32404	17918	62880
31	16051	33763	57194	16752	54450	19031	58580	47629	54132	60631
32	08244	27647	33851	44705	94211	46716	11738	55784	95374	72655
33	59497	04392	09419	89964	51211	04894	72882	17805	21896	83864
34	97155	13428	40293	09985	58434	01412	69124	82171	59058	82859
35	98409	66162	95763	47420	20792	61527	20441	39435	11859	41567
36	45476	84882	65109	96597	25930	66790	65706	61203	53634	22557
37	89300	69700	50741	30329	11658	23166	05400	66669	48708	03887
38	50051	95137	91631	66315	91428	12275	24816	68091	71710	33258
39	31753	85178	31310	89642	98364	02306	24617	09609	83942	22716
40	79152	53829	77250	20190	56535	18760	69942	77448	33278	48805
41	44560	38750	83635	56540	64900	42912	13953	79149	18710	68618
42	68328	83378	63369	71381	39564	05615	42451	64559	97501	65747
43	46939	38689	58625	08342	30459	85863	20781	09284	26333	91777
44	83544	86141	15707	96256	23068	13782	08467	89469	93842	55349
45	91621	00881	04900	54224	46177	55309	17852	27491	89415	23466
46	91896	67126	04151	03795	59077	11848	12630	98375	52068	60142
47	55751	62515	21108	80830	02263	29303	37204	96926	30506	09808
48	85156	87689	95493	88842	00664	55017	55539	17771	69448	87530
49	07521	56898	12236	60277	39102	62315	12239	07105	11844	01117

SECTION INSPECTION SHEET

FACILITY NAME OR NUMBER: GREEN ST

SECTION NUMBER: 5

DATE: 3/15/76

ASPHALT ☑ CONCRETE ☐

SURVEYED BY: M. Shahin

TOTAL NUMBER OF SAMPLES IN SECTION: 25

SKETCH OF SECTION (IF USEFUL)

SECTION CONDITION RATINGS	GOOD	FAIR	POOR
RIDE QUALITY		✓	
SAFETY	✓		
DRAINAGE			✓
SHOULDER			✓
OVERALL		✓	

COMMENTS ON SECTION CONDITION: SECTION IS DETERIORATING AT A FAST RATE DUE TO POOR DRAINAGE

Figure B7. Section inspection sheet.

CERL DISTRIBUTION

FOM

US Army, Europe
ATTN: AEAEN (4)

Director of Facilities Engineering
APO New York 09827

West Point, NY 10017
ATTN: Dept of Mechanics
ATTN: Library

HQDA (SGRD-EDE)

Chief of Engineers
ATTN: Tech Monitor
ATTN: DAEN-ASI-L (2)
ATTN: DAEN-FEE
ATTN: DAEN-FEE-A
ATTN: DAEN-FEP
ATTN: DAEN-FESA
ATTN: DAEN-FEZ-A
ATTN: DAEN-RDL
ATTN: DAEN-ZCP
ATTN: DAEN-PMS (11)
for forwarding to
National Defense Headquarters
Director General of Construction
Ottawa, Ontario K1A0K2
Canada

Canadian Forces Liaison Officer (4)
US Army Mobility Equipment
Research and Development Command
Ft Belvoir, VA 22060

British Liaison Officer (5)
US Army Mobility Equipment
Research and Development Center
Ft Belvoir, VA 22060

Airports and Const. Services Dir.
Technical Information Reference
Centre
kA0L, Transport Canada Building
Place de Ville
Ottawa, Ontario Canada k1A0N8

Ft Belvoir, VA 22060
ATTN: Learning Resources Center
ATTN: ATSE-TD-TL (2)
ATTN: Kingman Building, Library

US Army Foreign Science & Tech Center
ATTN: Charlottesville, VA 22901
ATTN: Far East Office

Ft Monroe, VA 23651
ATTN: ATEN
ATTN: ATEN-FE-ME

Ft Lee, VA 23801
ATTN: DRXMC-D (2)

Ft McPherson, GA 30330
ATTN: AFEN-FEB

USA-WES
ATTN: Concrete Laboratory
ATTN: Soils and Pavements Laboratory
ATTN: Library

6th US Army
ATTN: AFKC-LG-E

I Corps (ROK/US)Group
APO San Francisco 96358

US Army Engineer District
Saudi Arabia
ATTN: Library
New York
ATTN: Chief, Design Br
Buffalo
ATTN: Library
Pittsburgh
ATTN: Library
Norfolk
ATTN: Library
ATTN: Chief, NAOEN-M
Huntington
ATTN: Library
Wilmington
ATTN: Chief, SAWEN-D
Savannah
ATTN: Library
ATTN: Chief, SASAS-L
Mobile
ATTN: Library
ATTN: Chief, SAMEN
Vicksburg
ATTN: Chief, Engr Div
Louisville
ATTN: Chief, Engr Div
Detroit
ATTN: Library
St. Paul
ATTN: Chief, ED-D
Rock Island
ATTN: Library
ATTN: Chief, Engr Div
St. Louis
ATTN: Chief, ED-D
Kansas City
ATTN: Library (2)
ATTN: Chief, Engr Div
Omaha
ATTN: Chief, Engr Div
New Orleans
ATTN: Library
Fort Worth
ATTN: Library
ATTN: Chief, SWFED-D
ATTN: Chief, SWFED-F
Albuquerque
ATTN: Library
San Francisco
ATTN: Chief, Engr Div
Sacramento
ATTN: Library, Room 8307
ATTN: Chief, SPKED-D
Far East
ATTN: Chief, Engr Div
Japan
ATTN: Library
Alaska
ATTN: Library
ATTN: Chief, NPADE-R

US Army Engineer Division
Europe
ATTN: Technical Library
New England
ATTN: Chief, NEDED-T
Middle East (Rear)
ATTN: MEDED-T

US Army Engineer Division
South Atlantic
ATTN: Laboratory
ATTN: Chief, SADEN-TS
ATTN: Library
Huntsville
ATTN: Library (2)
ATTN: Chief, HNDED-M
ATTN: Chief, HNDED-SR
Lower Mississippi Valley
ATTN: Library
Ohio River
ATTN: Library
ATTN: Chief, Engr Div
North Central
ATTN: Library
Missouri River
ATTN: Library (2)
Southwestern
ATTN: Library
ATTN: Chief, SWDED-MA
Pacific Ocean
ATTN: Chief, Engr Div
ATTN: FM&S Branch
North Pacific
ATTN: Chief, Engr Div

AF Civil Engr Center/XRL
Tyndall AFB, FL 32401

Little Rock AFB
ATTN: 314/DEEE (Mr. Gillham)
Jacksonville, AR 72076

Port Hueneme, CA 93043
ATTN: Library (Code L08A)
ATTN: Morrell Library

Washington, DC
ATTN: Building Research Advisory Board
ATTN: Library of Congress (2)
ATTN: Dept of Transportation Library

Defense Documentation Center (12)

Engineering Societies Library
New York, NY 10017

Facilities Engineer
US Army Tank-Automotive Command
Attn. Amsta-XE (2)
22251 Van Dyke Road
Warren, Mi. 48090

Facilities Officer
Office of the Adjutant General (2)
P.O. Box 3786
San Juan, PR 00904

Hq. Fort Devens
Attn. Facilities Engineer (4)
Fort Devens, Ma. 01433

Commander
US Army Natick Laboratories
Attn. DFAE
Natick, Ma. 01760

Division Engineer
New England Division
Corps of Engineers
424 Trapelo Road
Waltham, Ma. 02154

Facilities Engineer
Army Materials and Mechanics
Research Center (2)
Watertown, Ma. 02172

Facilities Officer
Office of the Adjutant General
905 Commonwealth Avenue
Boston, Ma. 02215

Facilities Officer
Office of the Adjutant General
1051 North Main St.
Providence, RI 02904

Facilities Engineer, Ulm
APO New York 09035

District Engineer
U.S. Army Engineer District XXXX
Saudi Arabia
APO Riyadh, Saudi Arabia
New York, NY 09038

Facilities Engineer, Berchtesgaden
APO New York 09029

Facilities Engineer, Baumholder
APO New York 09034

Facilities Engineer, Bad Toelz
APO New York 09050

Facilities Engineer, Garmisch
APO New York 09053

Commanding General
5th Signal Command
Attn. SCCE-IF
APO New York 09056
Facilities Engineer, Worms
APO New York 09058

Facilities Engineer
3806 USAG Erlangen Support Act.
APO New York 09066

Facilities Engineer
Burtonwood Army Depot
APO New York 09075

Commander
NATO/SHAPE Support Group-Us
Attn. Facilities Engineer
APO New York 09088

Facilities Officer
Office of the Adjutant General
State Mil. Res., Airport Road
Concord, NH 03301

US Army Cold Regions Research &
Engineering Laboratories (2)
P.O. Box 282
Hanover, New Hampshire 03755
Attn. Mr. Rod Poland

Facilities Officer
Office of the Adjutant General (2)
Camp Keyes
Augusta, Me. 04330

Facilities Officer
Office of the Adjutant General
Bldg. 1, Camp Johnson
Winooski, Vt. 05404

Facilities Officer
Office of the Adjutant General
360 Broad St.
Hartford, CT 06115

Hq. Hotby, Engineer Division (2)
Bayonne, NJ 07002

US Army Electronics Command
Attn. Dir. of Instal. & Servs.
Fort Monmouth, NJ 07703

Facilities Engineer (4)
Fort Monmouth
Fort Monmouth, NJ 07703

Facilities Engineer
Picatinny Arsenal (3)
Plant Engineering Division
Dover, NJ 07301

Facilities Engineer, Heidelberg
APO New York 09102

Facilities Engineer, Grafenhoehr
APO New York 09114

Commanding Officer
Tuslog Det. 4
Attn. Facilities Engineer (1)
APO New York 09133

Facilities Engineer, Bamberg
APO New York 09139

Facilities Engineer, Fulda
US Army Hessen Engineer Dist.
APO New York 09146

Facilities Engineer, Stuttgart
APO New York 09154

Facilities Engineer, Aschaffenburg
APO New York 09162

Facilities Engineer, Karlsruhe
APO New York 09164

Facilities Engineer, Hanau
APO New York 09165

Commanding General
US Army Southern European
Task Force
Attn. The Engineer
APO New York 09169

Facilities Engineer, Giessen
APO New York 09169

Facilities Officer
Office of the Adjutant General
P.O. Box 979
Trenton, NJ 08625

Facilities Engineer
Hq. Fort Dix (4)
Fort Dix, NJ 08640

Commanding Officer
Afcent Support Element US
Attn. Facilities Engineer
APO New York 09011

Division Engineer
US Army Engr. Div. Mediterranean
APO New York 09019 XXX

Commanding Officer
8th Logistical Command
Attn. Facilities Engineer
APO New York 09019

Facilities Engineer
Schwaebisch Hall
APO New York 09025

Facilities Engineer, Wildfleckin
US Army Seventh Army TC.
Engr. Dist.
APO New York 09026

Sub-Facilities Engineer, Wertheim
APO New York 09047

Sub-Facilities Engineer,
Kitzingen
APO New York 09031

Facilities Engineer, Schweinfurt
APO New York 09033

Facilities Engineer Mgmnt. Course
Executive & Career Development
Dept.
US Army School, Europe (5)
APO New York 09172

Facilities Engineer, Hohenfels
US Army Seventh Army TC.
Engr. Dist.
APO New York 09173

Commanding Officer
US Army Maintenance Plant
Ober-Ramstadt
APO New York 09175

Facilities Engineer, Darmstadt
APO New York 09175

Facilities Engineer, Heilbronn
APO New York 09176

Facilities Engineer, Ansbach
APO New York 09177

Facilities Engineer, Augsburg
APO New York 09178

Commander, USASA, Europe
Attn. IAELG-CE XX
APO New York 09178

Commanding General
9th Hospital Center
APO New York 09180

Facilities Engineer Mgmnt. Course
Facilities Engineer Munich (5)
APO New York 09184

Facilities Engineer
Fort Drum (2)
Watertown, NY 13601

District Engineer
US Army Engr. Dist. Buffalo XX
Foot of Bridge Street
Buffalo, NY 14207

Facilities Engineer
Seneca Army Depot
Attn. AMXSE-SD (2)
Romulus, NY 14541

Commander
U.S. Army Support Detachment
Attn. Facilities Engineer
Oakdale, Pa. 15071

Commanding Officer
Fort Indiantown Gap
Attn. Facilities Engineer
Annville, Pa. 17003

Facilities Officer
Office of the Adjutant General
R.D. 2
Annville, Pa. 17003

Facilities Engineer
Hq. Carlisle Barracks (2)
Carlisle Barracks, Pa. 17013

Facilities Engineer
Inst. Engr. Div. Dir-Svcs (2)
New Cumberland Army Depot
New Cumberland, Pa. 17070

Facilities Engineer
Tobyhanna Army Depot (2)
Tobyhanna, Pa. 18466

Commanding Officer
13th USASA Field Station
Attn. Facilities Engineer
APO New York 09210

Facilities Engineer
Missile Support Command
APO New York 09221

Facilities Engineer, Kaiserslauten
APO New York 09227

Commanding General
32nd Army Air Defense Command
APO New York 09227

Commander
European Exchange System
Attn. Dir/Engineering Div.
APO New York 09245

Facilities Engineer, Bad Kreuznach
APO New York 09252

Facilities Engineer, Wuerzburg
APO New York 09301

Commanding Officer
US Army Petroleum Distribution Command
Attn. Engineer
APO New York 09305

Facilities Engineer, Goeppingen
APO New York 09157

Facilities Engineer, Bad Kissingen
APO New York 09330

Facilities Engineer, Mannheim
APO New York 09333

Facilities Engineer, Zweibruecken
APO New York 09372

Facilities Engineer
Scranton Army Ammunition Plant
156 Cedar Avenue
Scranton, Pa. 18502

Commander
Defense Personnel Support Ctr.
Attn. DPSC-IU, C/Civil Engr. Div.
2800 South 20th Street
Philadelphia, Pa. 19101

District Engineer
US Army Engr. Dist., Phila. XX
Custom House, 2nd & Chestnut St.
Philadelphia, Pa. 19106

Commanding Officer, Northern Div.
Naval Facilities Engr. Command
Naval Base, Attn. Code 10
Philadelphia, Pa. 19112

Facilities Officer
Office of the Adjutant General
State Armory, P.O. Box 607
Wilmington, DE 19899

Facilities Officer
Office of the Adjutant General
NG Armory, 2001 E. Capitol St.
Washington, DC 20003

Facilities Engineer
Walter Reed Army Medical Center
Washington, DC 20012 (2)

Hq. Military Traffic Mgmnt. &
Terminal Service
Attn. MTMTS-SVI
Washington, DC 20315

Office of the Engineer
Hq. USAREUR & Seventh Army
Fac. Engr. Division (3)
APO New York 09403

Facilities Engineer, Munich
APO New York 09407

Facilities Engineer, Bayreuth
APO New York 09411

Commander-In-Chief
US Air Forces In Europe
APO New York 09633

Facilities Engineer, Nuernberg
APO New York 09696

United States Commander, Berlin
& Commanding General
United States Army, Berlin
Attn. Div. Installation Services
APO New York 09742

Commanding Officer
Special Ammunition Support
Command
APO New York 09757

Commander
193rd INF BDE-CZ
Attn. DFAE Drawer 923
Ft. Clayton, Canal Zone
APO New York 09827

Area Facilities Engineer
4th Missile Command
apo San Francisco 96208

Area Facilities Engineer
2D Infantry Division
APO San Francisco 96224

Chief, National Guard Bureau
Attn. Army Installations Div. XX
Washington, DC 20315

Facilities Engineer
U.S.A. Military Dist. of Wash. (3)
Bldg. 42, Fort Leslie J. McNair
Washington, DC 20319

Commanding Officer, Chesapeake Div.
Naval Facilities Engrg. Command
Washington, DC 20390

Facilities Engineer
Fort George C. Meade
1½ & Chisholm Street
Fort George G. Meade, Md. 20755

Commanding General
Hq. First US Army
Attn. AHABD-E
Fort George G. Meade, Md. 20755

Director National Security Agcy.
Attn. L-13
9808 Savage Road
Fort George G. Meade, Md. 20755

Facilities Engineer
Harry Diamond Laboratories
Attn. AMXDO-FA (2)
2800 Power Hill Road
Adelphi, Md. 20783

Facilities Engineer
Aberdeen Proving Ground (2)
Attn. STEAP-PE Bldg. 5256
Aberdeen Proving Ground, Md.
21005

Area Facilities Engineer
I Corps GP
APO San Francisco 96358

The Division Engineer
US Army Engineer Division
Pacific Ocean
APO San Francisco 96558

District Engineer
US Army Engr. Dist. New York XX
26 Federal Plaza
New York, NY 10007

Division Engineer
US Army Engr. Div., N. Atl. XXX
90 Church Street
New York, NY 10007

Superintendent
US Military Academy
Attn. Facilities Engineer (2)
West Point, NY 10996

The Engineer
Hq. US Army Terminal Command
Atlantic
Brooklyn, NY 11250

Facilities Engineer
Attn. AHBCL-EN (3)
Fort Hamilton
Brooklyn, NY 11252

Facilities Engineer
Hq. Watervliet Arsenal (1)
Watervliet, NY 12189

Facilities Officer
Office of the Adjutant General
Public Security Bldg., St. Campus
Albany, NY 12226

District Engineer
US Army Engr. Dist., Norfold XX
Ft. Norfolk, 803 Front Street
Norfolk, VA 23510

Commander, Atlantic Division
Naval Facilities Engrg. Command
Attn. Code 10
Norfolk, VA 23511

Facilities Engineer
US Army Transportation Center
& Fort Eustis (3)
Fort Eustis, VA 23604

US Army Logistics Mgmt. Center
Attn. AMXMD-LS-Mr. Jones
Fort Lee, VA 23801

USA Logistics Management Center
Attn. AMXMC-LS
Fort Lee, VA 33801

Facilities Engineer
Fort Lee (3)
Fort Lee, VA 23801

Facilities Engineer
Fort Pickett (2)
Blackstone, VA 23824

Commanding Officer
Radford Army Ammunition Plant
Radford, VA 24141

Facilities Officer
Off. of the Adjutant General
Charleston, WV 25305

District Engineer
US Army Engr. Dist. Huntington XX
P.O. Box 2127
Huntington, WV 25721

Commanding General
US Army Test & Evaluation Command
Attn. AMSTE-LG-F
Aberdeen Proving Ground, Md. 21005

Facilities Officer
Office of the Adjutant General
5th Regement Armory
Baltimore, MD 21201

District Engineer
US Army Engr. Dist., Baltimore
P.O. Box 1715
Baltimore, MD 21203

Facilities Engineer
Fort Holabird (2)
Fort Holabird, MD 21219

Facilities Engineer
Fort Detrick (2)
Frederick, MD 21701

Commanding Officer
US Army Joint Support Command (2)
Attn. Facilities Engineer
Fort Ritchie, MD 21719

Facilities Engineer
Dugway Proving Ground (2)
Dugway, UT 84022

Commanding General
US Army Material Command (3)
5001 Eisenhower Ave.
Alexandria, VA 22304

Commander & Director
U.S. Army Facilities Engrg.
Support Agency
MERDC
Fort Belvoir, VA 22060

Facilities Engineer
Tarheel Army Missile Plant
Burlington, NC 27215

Facilities Officer
Off. of the Adjutant General
P.O. Box 26268
Raleigh, NC 27611

Facilities Engineer (4)
SVIII Airborne Corps & Fort Bragg
Fort Bragg, NC 28307

Facilities Engineer
Sunny Point Army Terminal (2)
Southport, NC 28416

District Engineer
US Army Engr. Dist., Wilmington
P.O. Box 1890 XX
Wilmington, NC 28401

Facilities Officer
Off. of the Adjutant General
1225 Bluff Road
Columbia, SC 29201

Facilities Engineer
Fort Jackson (3)
Fort Jackson, SC 29207

District Engineer
US Army Engr. Dist., Charleston
P.O. Box 919 XX
Charleston, SC 29402

Facilities Engineer
Charleston Army Depot (1)
North Charleston, SC 29406

Commander-CODE 400
Charleston Naval Shipyard
Naval Base

Commandant
US Army Engineer School (5)
108 Humphries Hall
Attn. Fac. Engr. Mgt. Course
Fort Belvoir, VA 22060

Facilities Engineer (4)
US Army Engineer Center &
Fort Belvoir
Fort Belvoir, VA 22060

Facilities Engineer
USASA Field Station
Vint Hill Farms Station
Warrenton, VA 22186

Facilities Engineer
Fort Myer (2)
Fort Myer, VA 22208

Commanding Officer
US Army Garrison (2)
Arlington Hall Station
Attn. Facilities Engineer
Arlington, VA 22212

Commanding General
Hq. US Army Security Agency
Attn. AILOGI/FE
Arlington Hall Station
Arlington, VA 22212

Director, Defense Supply Agency
Attn. DSAH-WIS
Cameron Station
Alexandria, VA 22314

Headquarters, Cameron Station
Attn. Facilities Engineer (2)
Alexandria, VA 22314

Commanding Officer, Southern Div.
Naval Facilities Engrg. Command
Attn. Code 10
P.O. Box 10068
Charleston, SC 29411

Facilities Engineering
Attn. AFZK.FE
Ft. Gillen, GA 30050

Facilities Engineer
Atlanta Army Depot
Forest Park, GA 30050

Facilities Engineer
Fort McPherson (3)
Fort McPherson, VA 30330

Facilities Engineer
US Army SCH/TNG. Ctr. &
Fort Gordon (3)
Fort Gordon, GA 30905

Commanding Officer
Forscom, Eng. Div. (3)
Fort McPherson, GA 30330

Division Engineer
US Army Engr. Div., So. Atl. XX
510 Title Bldg., 30 Pryor St., NW
Atlanta, GA 30303

Facilities Engineer
Fort Stewart (4)
Fort Stewart, GA 31314

Facilities Officer
Off. of the Adjutant General
959 E. Confederate St.
P.O. Box 4839
Atlanta, GA 30302

Commanding Officer
Fort A. P. Hill
Attn. Facilities Engineer (2)
Bowling Green, VA 22427

Deputy Area Engineer
Western Virginia Area Office
P.O. Box 129
Berryville, VA 22611

A.F.E.T.A. Camp Peary
Attn. Public Works Office
P.O. Box 1447
Williamsburg, VA 23185

Center Engineer
Defense General Supply Center (2)
Richmond, VA 23219

Facilities Officer
Office of the Adjutant General
Room 506, Ninth St., State Ofc.
Bldg.
Richmond, VA 23219

Facilities Engineer
Fort Monroe (2)
Fort Monroe, VA 23351

Facilities Officer
Office of the Adjutant General
Room 506, Ninth St., State Ofc.
Richmond, VA 23219

Commanding Officer
Tradoc, Eng. Div. (3)
Fort Monroe, VA 23351

Facilities Engineer
Fort Story (2) XX
Fort Story, VA 23459

District Engineer
US Army Engr. Dist., Savannah
P.O. Box 889
Savannah, GA 31402

Facilities Engineer
US Army Infantry Center (4)
Fort Benning, GA 31905

Commanding Officer
Savannah Army Depot
Attn. AMXSV-DF
Savannah, GA 61074

Facilities Officer
Off. of the Adjutant General
State Arsenal
St. Augustine, FL 32084

District Engineer
US Army Engr. Dist., Jacksonville
P.O. Box 4970
Jacksonville, FL 32201

Commander
31st ADA Brigade
Attn. ADMSO-EN
Homestead AFB, FL 33030

Commanding General
US Army Safeguard Command
Attn. SSC-B
P.O. Box 1500
Huntsville, AL 35807

Division Engineer
U.S. Army Engr. Div., Huntsville
P.O. Box 1600, West Station XX
Huntsville, AL 35807

District Engineer
US Army Engr. Dist., Louisville
P.O. Box 59
Louisville, KY 40201

Facilities Engineer
Blue Grass Depot Activity of the
Lexington Blue-Grass Army Depot
Richmond, KY 40475

Facilities Engineer
Lexington Blue-Grass Army Depot
Lexington, KY 40507

Facilities Officer
Office of the Adjutant General
The Capitol
Frankfort, KY 40601

Facilities Engineer
Fort Campbell (4)
Fort Campbell, KY 42223

Center Engineer
Defense Construction Supply Ctr.
Attn. DCSC-IS/E (2)
Columbus, OH 43215

Facilities Officer
Office of the Adjutant General
Bldg. 110, Fort Hayes
Columbus, OH 43216

Division Engineer
US Army Engr. Div., Ohio River
P.O. Box 1159
Cincinnati, OH 45201

Facilities Engineer (2)
US Army School Center &
Fort Benjamin Harrison, Bldg. 28
Fort Benjamin Harrison, IN 46216

Headquarters
US Army Missile Command
Attn. Facilities Engr. Bldg. 7171
Redstone Arsenal, AL 35809 (2)

Facilities Officer
Office of the Adjutant General
1720 Federal Drive, P.O. Box 1311
Montgomery, AL 36102

Facilities Engineer
Anniston Army Depot (2)
Anniston, AL 36201

Facilities Engineer (3)
Fort McClellan
Fort McClellan, AL 36205

Facilities Engineer (4)
Fort Rucker, AL 36362

District Engineer
US Army Engr. Dist., Mobile
P.O. Box 2288
Mobile, AL 36628

District Engineer
US Army Engr. Dist., Nashville
P.O. Box 1070
Nashville, TN 37202

Facilities Officer
Off. of the Adjutant General
NG Armory, Sidco Drive
Nashville, TN 37204

Commanding Officer
Holston Army Ammunition Plant
Kingsport, TN 37662

Facilities Officer
Office of the Adjutant General
Mil. Dept. of Indiana, Stout Field
Indianapolis, IN 46241

Commanding Officer
Indiana Army Ammunition Plant
Charleston, IN 47111

Commanding Officer
Jefferson Proving Ground (2)
Attn. STEJP-FD
Madison, IN 47250

Commanding Officer
Newport Army Ammunition Plant
P.O. Box 121
Newport, IN 47966

Facilities Engineer
Detroit Arsenal
Detroit, MI 48200

Commanding Officer
US Army Missile Command
Attn. AMSMI-IN
38111 Van Dyke Ave.
Utica, MI 48087

District Engineer
US Army Engr. Dist., Detroit (1)
P.O. Box 1027
Detroit, MI 48231

Facilities Officer
Office of the Adjutant General
2500 S. Washington Ave.
P.O. Box 210
Lansing, MI 48901

District Engineer
US Army Engr. Dist., Memphis XX
668 Federal Office Bldg.
Memphis, TN 38103

Facilities Engineer
Defense Depot, Memphis (2)
Attn. DDMT-ISCE
Memphis, TN 38115

Commanding Officer
Milan Army Ammunition Plant
Milan, TN 38358

Division Engineer
US Army Engr. Div., Lower Miss.
Valley XX
P.O. Box 80
Vicksburg, MS 39180

District Engineer
US Army Engr. Dist., Vicksburg XX
P.O. Box 60
Vicksburg, MS 39180

Director
U.S. Army Engineer Waterways
Experiment Station (3)
P.O. Box 631
Vicksburg, MS 39180

Facilities Officer
Off. of the Adjutant General
P.O. Box 5027, Fondren Station
Jackson, MS 39216

Facilities Engineer
US Army Armor Center (4)
Fort Knox, KY 40121

Commanding Officer
Muskegon Army Engine Plant
Muskegon, MI 49440

Professor of Military Science
Fifth US Army ROTC Instr. Group
Senior Division, Area 50
Michigan Technological Univ.
Houghton, MI 49931

Facilities Officer
Office of the Adjutant General
P.O. Box 616
Des Moines, IA 50303

Facilities Engineer
Iowa Army Ammunition Plant
Burlington, IA 52601
Attn. SMUIO-M-R

Facilities Officer
Office of the Adjutant General
3020 Wright Street
P.O. Box 328
Madison, WI 53701

District Engineer
US Army Engr. Dist., St. Paul
1217 US PO & Customhouse
St. Paul, MN 55101

Facilities Officer
Office of the Adjutant General
Veterans Service Bldg.
St. Paul, MN 55101

Facilities Engineer
Camp McCoy (2)
Camp McCoy, WI 54656

Facilities Officer
Office of the Adjutant General
Camp Rapid
Rapid City, SD 57704

Facilities Officer
Office of the Adjutant General
P.O. Box 1817
Bismarck, ND 58401

US Army Safeguard Command
Stanley R. Mickelson Safeguard
Complex Attn. DFAE
Nekoma, ND 58355

Facilities Officer
Office of the Adjutant General
1100 N. Main Street
Helene, NT 59601

Facilities Officer
Fort Sheridan, Bldg. 119 (3)
Fort Sheridan, IL 60037

Commanding Officer
Joliet Army Ammunition Plant
Attn. SMUJA-L
Joliet, IL 60436

District Engineer
US Army Engr. Dist., Chicago
219 S. Dearborn St.
Chicago, IL. 60604

Division Engineer
US Army Engr. Div., N. Central
536 S. Clark Street
Chicago, IL 60605

Commanding General
US Army Weapons Command (2) XXX
Attn. AMSWE-ISL
Rock Island, IL 61201

District Engineer
US Army Engr. Dist., New Orleans
P.O. Box 60267
New Orleans, LA 70160

Commanding Officer
Louisiana Army Ammunition Plant
P.O. Box 58
Shreveport, LA 71102

Facilities Engineer
Fort Polk (3)
Fort Polk, LA 71459

Facilities Engineer
Pine Bluff Arsenal (2)
Pine Bluff, AR 71601

Facilities Officer
Office of the Adjutant General
Ft. McAlister, P.O. Box 678
North Little Rock, AR 72115

District Engineer
US Army Engr. Dist., Little Rock
P.O. Box 867
Little Rock, AR 72203

Commanding Officer
U.S. Army Caretaker Detachment
Fort Chafee, AR 72905

Facilities Officer
Office of the Adjutant General
2205 N. Central Street
Okalahoma City, OK 73105

Facilities Engineer
US Army Arty. & Missile Ctr. &
Fort Sill (4)
Fort Sill, OK 73503

Commander
US Army Installation Sup. Act.
Granite City, IL 62040

Chief
USAMC Installation & Servs. Agcy.
Rock Island Arsenal (4)
Attn. AMCSI-RI
Rock Island, IL 61202

Facilities Officer
Office of the Adjutant General
Room 200, Armory Office Bldg.
Springfield, IL 62706

District Engineer
US Army Engr. Dist., St. Louis
210 N. 12th Street
St. Louis, Mo. 63101

District Engineer
US Army Engineer Dist., Kansas City
700 Federal Building
601 East 12th St.
Kansas City, MO 64106

Commanding Officer
Lake City Army Ammunition Plant
Independence, MO 64056

Facilities Officer
Office of the Adjutant General
1717 Industrial Drive
Jefferson City, MO 65101

Commanding General
Hq. USATC & Fort Leonard Wood (4)
Attn. Facilities Engineer
Fort Leonard Wood, MO 65473

Facilities Engineer
Atchinson Ordnance Storage Fac.
Atchinson, KS 66002

District Engineer
US Army Engr. Dist., Tulsa
P.O. Box 61
Tulsa, OK 74102

Division Engineer
US Army Engr. Div., Southwestern
1114 Commerce Street
Dallas, TX 75202

Commanding Officer
Lone Star Army Ammunition Plant
Attn. SMULS-O
Texarkana, TX 75501

Facilities Engineer
Red River Army Depot (2)
Texarkana, TX 75501

Commanding Officer
Longhorn Army Ammunition Plant
Attn. Publications Officer
Marshall, TX 75670

Facilities Engineer
Fort Wolters
Mineral Wells, TX 76067

District Engineer
US Army Dist. Engr., Fort Worth
P.O. Box 17300
Fort Worth, TX 76102

Judy Edgar Librarian
US Army Engr. Dist., Forth Worth
P.O. Box 17300
Fort Worth, TX 76102

Facilities Engineer
Fort Hood (4)
Fort Hood, TX 76544

Facilities Engineer
Fort Leavenworth (4)
Fort Leavenworth, KS 66027

Commanding Officer
Sunflower Army Ammunition Plant
Attn. SMUSU-O
Lawrence, KS 66044

Facilities Engineer
Fort Riley (4)
Fort Riley, KS 66442

Facilities Officer
Office of the Adjutant General
Room 10-State Capitol
Topeka, KS 66612

Division Engineer
US Army Engr. Div., Mo. River
P.O. Box 103, Downtown Sta.
Omaha, NB 68101

District Engineer
US Army Engr. Dist., Omaha
7410 US Post Office & Court Hse.
215 No. 17th Street
Omaha, NB 68102

Facilities Officer
Office of the Adjutant General
1300 Military Road
Lincoln, NB 68508

Commanding Officer
Cornhusker Army Ammunition Plt.
Attn. Chief Operations Rev. Div.
Grand Island, NB 68801

Facilities Officer
Office of the Adjutant General
Hq. BD., Jackson Barracks
New Orleans, LA 70140

Commanding General
Hq. US Army Fifth (2)
Attn. Chief, Engr. Div. DCSLOG
Fort Sam Houston, TX 78234

US Army
Health Services Command
Ft. Sam Houston, TX.(2)
Attn. HSLO-F

Facilities Engineer
Fort Sam Houston (3)
Fort Sam Houston, TX 78234

Facilities Officer
Office of the Adjutant General
Box 5218
Austin, TX 78703

Director of Facilities Engrg.
Hq. US Army Air Defense (4)
Center & Fort Bliss
Fort Bliss, TX 79916

Commanding Officer
US Army Rocky Mountain Arsenal (2)
Attn. AMXRM-F
Denver, CO 80240

Facilities Officer
Office of the Adjutant General
300 Logan St.
Denver, CO 80203

Facilities Engineer
Fitzsimons General Hospital
Denver, CO 80240

Facilities Engineer
Fort Carson (4)
Fort Carson, CO 80913

Facilities Engineer
Sharpe Army Depot Bldg. T-42 (2)
Lathrop, CA 95330

Commander
Defense Depot Tracy (2)
Attn. DDTC-SE
Tracy, CA 95330

Facilities Engineer
Sacramento Army Depot (2)
Sacramento, CA 95813

District Engineer
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650 Capitol Hall
San Francisco, CA 95814

Facilities Officer
Office of the Adjutant General
P.O. Box 8143, 2415 1st Avenue
Sacramento, CA 95818

Facilities Engineer
Sierra Army Depot (2)
Herlong, CA 96113

Area Facilities Engineer
ATEGU
APO San Francisco 96218

Area Facilities Engineer
Pusan
APO San Francisco 96259

Area Facilities Engineer
Camp Humphreys
APO San Francisco 96271

Facilities Engineer
Pueblo Army Depot (2)
Pueblo, CO 81001

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Office of the Adjutant General
5500 Biship Blvd., P.O. Box 1709
Cheyenne, WY 82001

Facilities Officer
Office of the Adjutant General
P.O. Box 1098
Boise, ID 83701

Commanding Officer
Tooele Army Depot
Attn. AMXTEOSEF
Tooele, UT 84074

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Office of the Adjutant General
P.O. Box 8000
Salt Lake City, UT 84108

Facilities Engineer
US Army Support Detachment
Salt Lake
P.O. Box 8200
Salt Lake City, UT 84108

Chief, Civil Engineering Div.
Defense Depot. Ogden
Ogden, UT 84401

Facilities Officer
Office of the Adjutant General
747 West Van Buren St.
Phoenix, AZ 85007

Facilities Engineer
Navajo Depot Activity
Navajo, AZ 86509

District Engineer
US Army Engr. Dist., Far EAst
APO San Francisco 96301

Area Facilities Engineer (2)
APO San Francisco 96301

Commander
US Army Facilities Engineer
Activity Korea
APO San Francisco 96301

Facilities Engineer
Fort Buckner (2)
Attn. RIFB-EN-AG
APO San Francisco 96331

District Engineer
US Army Engr. Dist., Okinawa
APO San Francisco 96331

Commanding General, USARJ
Attn. Engineer
APO San Franciso 96343

District Engineer
U.S. Army Engr. Dist., Japan
APO San Francisco 96343

Facilities Engineer
Attn. Chief, Admin. & Svc. Div.
US Army Garrison, Japan (2)
APO San Francisco 96343

Commanding Officer
Kwajalein Missile Range
Attn. SSC-RKL
APO San Francisco 96555

Facilities Engineer
Yuma Proving Ground (3)
Attn. STEYP-IRU
Yuma, AZ 85364

Commanding General
US Army Strategic Communications
Command (2)
Attn. SCC-ENGR-CP
Fort Huachuca, AZ 85613

Facilities Engineer
US Army Garrison (4)
Fort Huachuca, AZ 85613

Facilities Officer
Office of the Adjutant General
P.O. Box 4277
Santa Fe, NM 87502

Facilities Engineer
White Sands Missile Range (3)
Attn. STEWS-PE
White Sands Missile Range, MN
88002

Facilities Officer
Office of the Adjutant General
P.O. Box 1120
Carson City, NV 89701

District Engineer
US Army Engr. Dist., Los Angeles
P.O. Box 2711
Los Angeles, CA 90053

Facilities Engineer
Fort MacArthur (2)
Fort MacArthur, CA 90731

Facilities Engineer
Fort Irwin
Fort Irwin, CA 92310

Facilities Engineer
Fort Shafter
Honolulu, Hawaii 96815

Division Engineer
US Army Engr. Div., Pac. Ocean
Bldg. 97, Fort Armstrong
Honolulu, Hawaii 96815

Facilities Officer
Office of the Adjutant General
Fort Ruger
Honolulu, Hawaii 96816

District Engineer
US Army Engr. Dist., Portland
P.O. Box 2946
Portland, OR 97208

Division Engineer
US Army Engr. Div., N. Pacific
210 Custom House
Portland, OR 97209

Facilities Officer
Office of the Adjutant General
2150 Fairgrounds Road, N.E.
Salem, OR 07130

Facilities Engineer
Umatilla Army Depot (2)
Herminston, OR 97838

Commanding General
Madigan General Hospital
Attn. Engineer Division
Tacoma, WA 98431

Facilities Engineer
Fort Ord (4)
Fort Ord, CA 93941

Naval Civil Engineering Lab.
Code L03C
Port Hueneme, CA 93043

Commanding Officer, Western Div.
Naval Facilities Engrg. Command
Attn. Code 10
San Bruno, CA 94066

District Engineer
US Army Engr. Dist.
San Francisco
100 McAllister Street
San Francisco, CA 94102

Division Engineer
US Army Engr. Div., South Pacific
630 Sansome Street, Rm. 1216
San Francisco, CA 94111

Facilities Engineer
Presidio of San Francisco (2)
San Francisco, CA 94129

Commanding General
Hq., Sixth US Army (2)
Attn. Engr. Division, DCSLOG
Presidio of San Francisco, CA
94129

Facilities Engineer
Oakland Army Base (2)
Oakland, CA 94626

Hq., Western Area, MTMTS
Attn. MTW-FAC
Oakland Army Base
Oakland, CA 94626

Facilities Engineer
Fort Lewis (4)
Fort Lewis, WA 98432

District Engineer
US Army Engr. Dist., Seattle (2)
1519 Alaskan Way, South
Seattle, WA 98134

Facilities Engineer
Fort Lawton
Seattle, WA 98199

Usaral Yukon Command & Fort Wainwright
Attn. Facilities Engineer
APO Seattle 98731

Commanding Officer
Fort Wainwright (2)
Attn. FAcilities Engineering
APO Seattle 98731

Facilities Engineer
Fort Greeley (2)
APO Seattle 98733

Facilities Engineer
Hq., Fort Richardson (3)
APO Seattle 98749

Area Facilities Engineer
USA Pol Depot
APO Seattle 98766

District Engineer
US Army Engr. Dist., Walla Walla
Bldg. 602, City-County ARPT.
Walla Walla, WA 99362

Facilities Officer
Office of the Adjutant General
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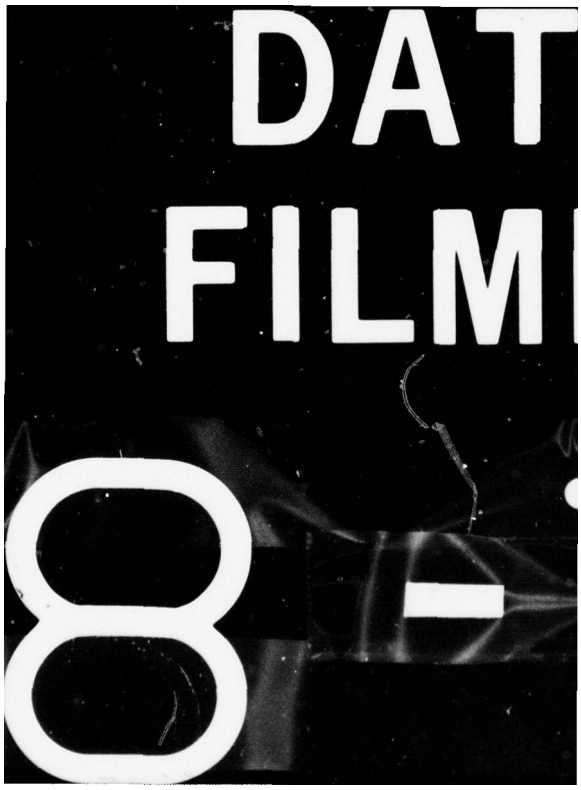
Anchorage, AK 99501

District Engineer
US Army Engr. Dist., Alaska
P.O. Box 702
Anchorage, AK 99501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